Call-A.P.P.L.E.

June 1984
Vol. 7, No. 6

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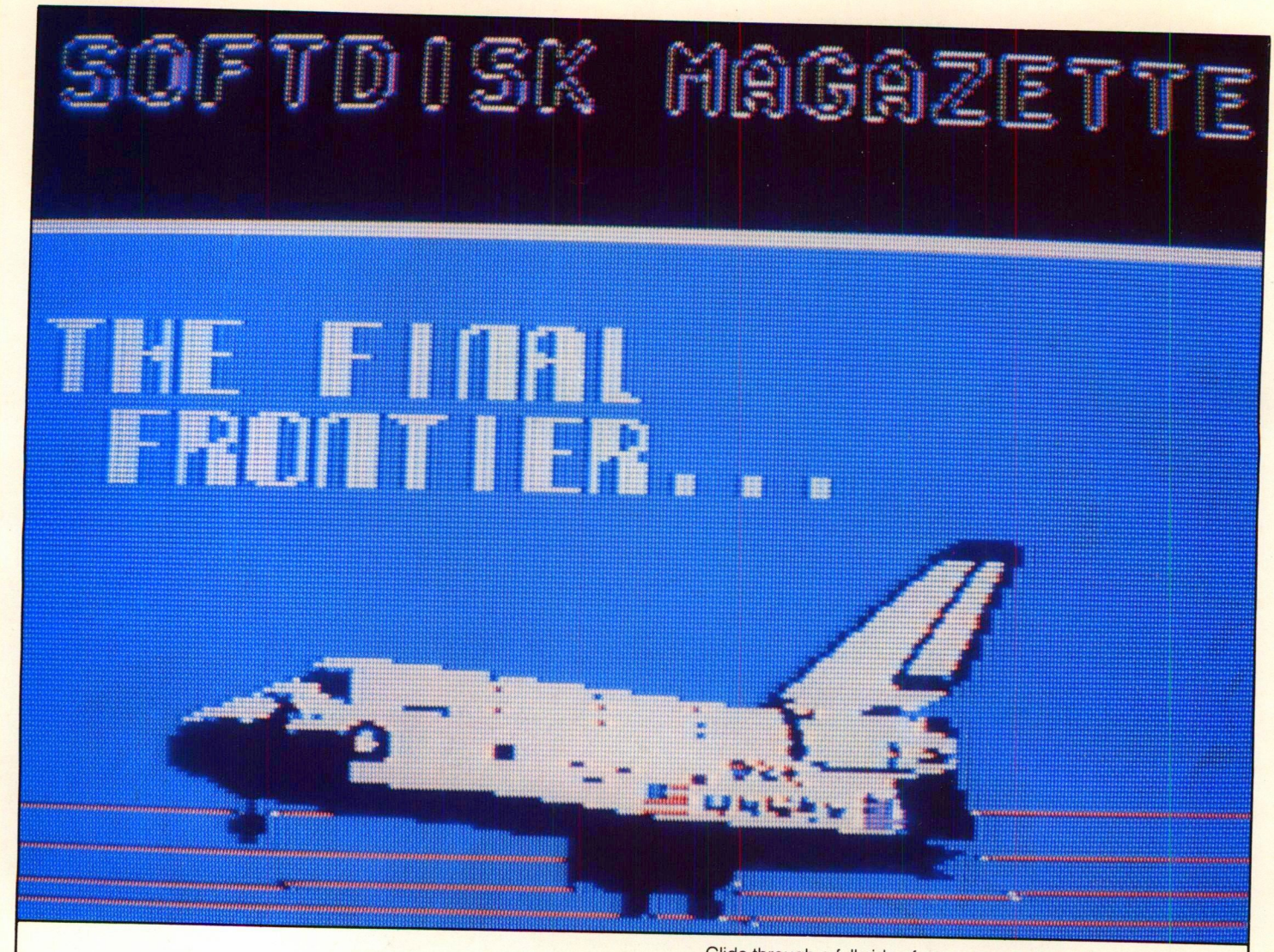

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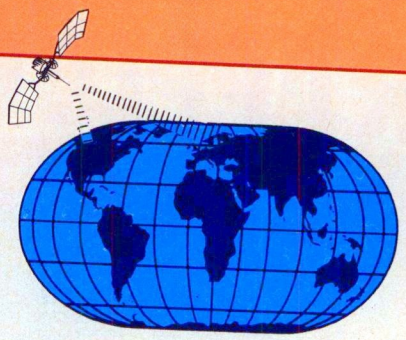


Call-

Volume 7, Number 6

Music

6 Grab the Music and Run
John A. Oakey
A simple way to start your Apple II on a singing career

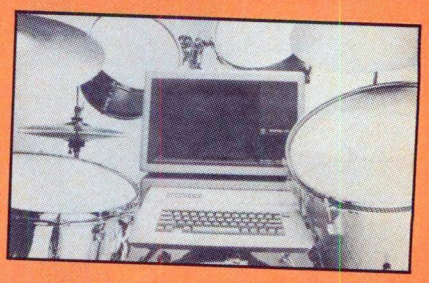
9 A Shortcut to Music Programming in Applesoft
Dave Kelly
Putting life into your Apple II speaker

10 Eighteenth Century Dice Music Games
William K. Dolen
Looking back at music history for a fascinating use of your computer/synthesizer

13 Metronome
Jack Bender
This ready-to-use program converts your Apple into a rhythm regulator

23 Mountain Music System
Greg Dunn
Another good synthesizer, including firmware and software

27 Passport Designs Soundchaser System
William K. Dolen
Add a keyboard and sophisticated software to the Mountain Music System



31 Drum-Key
Gary Kruger
A whole percussion section for your Apple II slot

Reviews

17 ALF Music Card MC1
Dave Kelly/Lee Webster
Two views of a sound product

Education

32 The Sound of Logo
Jeff Sandys
Making your turtle sing like a bird

ADVERTISER INDEX

A.P.P.L.E. 63
Access Micro 55
B & D Electronics 12
Baudville Software 16
Beagle Bros ..... 14 & 15
Bytes & Pieces 36
David Data 29
Doublestuff Software 7
Graysoft 18
Hardcore Computist 37
Hayes Microcomputer Products 4
Hollywood Hardware 79
Interactive Microware 31
Interior Design Systems 57
Laing Electronics ..... 20 & 25
Name-Brand Software 59
Nibble Magazine 77
Quorum International 42
Schwartz Computer Consulting 26
Sibsource Inc 19
Softdisk C3

A.P.P.L.E.™

Apple PugetSound Program Library Exchange

World's Largest Apple User Group

June 1984

34 **A CONDUIT to Educational Software**
Lee Webster
Math teaching programs from an excellent national software source are reviewed

Business

38 **THE Spreadsheet Sheet: Data Analysis #7**
Jeffrey M. Jacques, Ph.D.
More on the use of chi square inferential statistics with THE Spreadsheet

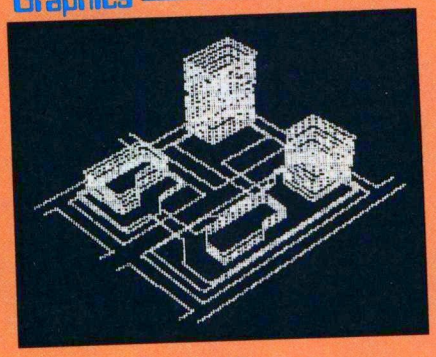
47 **Loan Amortization**
John Pinkerton
This BASIC program calculates your loan payments before going to the bank

Random Access

35 **Northern Spy: Surveying the Software Market**
Rick Sutcliffe
Our Canadian connection makes some fearless predictions about future trends in the software marketplace

50 **Save the Toolkit—A Call to Arms**
Dave Redhed
Will Lisa software developers be left out on a limb?

Graphics



53 **Review of IMAGINATOR**
William R. Miller
An excellent software package for professional 3D graphics

Letters

58 **A.P.P.L.E. Doctor**
Bruce F. Field
Good medicine for your ailing computer

62 **Write-A.P.P.L.E.**

New From Apple

5 **When Apple Revealed the *IIc*: Did the Earth Move?**
Don Elman
Now that the *IIc* has had its debut, how will it appeal to the consumer?

Departments

5 **The INNER CIRCUIT**
Don Elman
Overview of this month's theme and features

68 **Member Billboard**
Some A.P.P.L.E. business, and a special note of nostalgia by Dave Lingwood

70 **The Marketplace**
New product announcements, including software and hardware for the *IIc*

80 **Unclassifieds**

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Softronics	1
Software Banc	60
StarLogic	11
Street Electronics	8
Southern California Research Group	61
Technology One	70
Telephone Software Connection	21
Titan Technologies	C4
Trac Systems Corp.	52
VF Associates	24
Weekly Reader Family Software	C2

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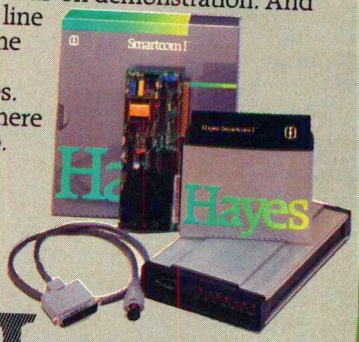

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Don Elman

The INNER CIRCUIT

When Apple Revealed the *IIc*: Did the Earth Move?

Computers Can Sing

UNTIL the last few years, sound output from a computer was virtually unheard of. The tiny speakers added to early Apples opened up a new world of multisensory possibilities for both programmers and users. Still, given the primitive quality of that sound, most Apple II software that attempts to take advantage of it is limited to R2D2-like beeps or unpleasant "bronx cheers."

As people look for more serious uses of their computer hardware, the desire for sophisticated, higher fidelity output has led to the advent of electronic music machines. Of course, the first professional synthesizers produced wonderful, complex sounds (if you can pronounce "Moog" you know what I mean), but were extremely expensive. Fortunately, as with most microelectronics, the cost of sound circuitry has dropped to the point where even a $200 home computer can have a full-fledged synthesizer built right in. In this issue of *Call -A.P.P.L.E.*, we sample the range of Apple music possibilities from the simple to the sublime.

Features

Our music theme section begins with two articles that describe how to get plain, single-tone music out of your Apple II—**Grab the Music and Run** by John Oakey, and **A Shortcut to Music Programming in Applesoft** by Dave Kelly. If you're looking for new applications of your Apple, try Jack Bender's **Metronome**. In **Eighteenth Century Dice Music Games**, William Dolen describes how computers can be used to resurrect an old music-generating technique. In our education section, Jeff Sandys (**The Sound of Logo**) demonstrates why the popular turtle-graphics language has more facets than most people think.

Reviews

Once you're fired up about the prospect of making music with your Apple, you might want to consider expanding your system with a specialized add-on. To help in that decision, we offer detailed reviews of a sample of the excellent products that are available.

Completing this issue is our usual potpourri of general interest features, including solutions to technical problems, new product announcements, software surveys, and business-related items. To get off to a running start, let's begin with a further look at Apple's new *IIc*, with particular attention to how it is positioned in the computer market.

THE *IIc* IS FINALLY out of the bag—literally, that is, if you think about the optional carrying pouch with shoulder strap. On April 24th your itinerant A.P.P.L.E. representatives journeyed to San Francisco's Moscone Center and attended a combination unveiling, trade show, and dealer pep rally that was titled (somewhat ambitiously) "Apple II Forever." By now you have likely begun to feel the initial force of Apple's multi-media, multi-million-dollar advertising campaign designed to make the *IIc* as irresistible to the average consumer as Pepsi Cola. (No wonder, since John Sculley, Apple's current President, is a former Pepsi executive.)

Last month, readers of *Call -A.P.P.L.E.* were treated to one of the first detailed overviews of the *IIc* to appear in a national computer periodical.

(Continued on page 40)

Doubly Proud Father

Steve "Woz" Wozniak, co-founder of Apple Computer, Inc., watches as two of his offspring interact with each other.

Grab the Music and RUN

John A. Oakey

IN the "early days" of Apple Computing (five or six years ago) most owners had Integer Basic on the motherboard and Applesoft resided in the computer — if it resided in the computer at all — on a ROM card in slot #0. If you've had your Apple hanging around that long, dig out some of those dusty old disks with the early games that were passed from user to user (in the public domain, of course) and see if you can find the dimension of entertainment which just isn't there anymore.

In case you haven't had your Apple around that long, I'll put a large part of that now missing dimension in a single word — *music.* I have games which open to the strains of "The Star Spangled Banner" and play "Charge!" when it's somebody's turn to do something. All were written in Integer Basic and the music came "free" compliments of the *Programmer's Aid #1.* (I could never help wondering if there wasn't supposed to be a Programmer's Aid #2.)

What follows is a why-didn't-we-think-of-this-before idea that makes it possible to put that dimension back into our programs — *in Applesoft.* The only requirements for achieving this minor miracle are that you have a 48K Apple, a disk drive, a DOS 3.3 system master disk and about 20 minutes to spare.

The Process

1) Type in and carefully proofread the accompanying short program entitled MUSIC GRABBER CREATOR, then RUN it to create a text file named MUSIC GRABBER on a clean storage disk.
2) Put a *copy* of your system master in the disk drive and type: BLOAD INTBASIC, A$800.
3) Put the disk with the text file MUSIC GRABBER in your drive and type EXEC MUSIC GRABBER.
4) With the storage disk in your drive type: BSAVE MUSIC ROUTINES, A$9470, L$E5. Turn your Apple off.

That, believe it or not, is all there is to it! If you happen to have the Programmer's Aid #1 Installation and Operating manual you can follow those instructions with only three minor changes. First, you must set HIMEM: to 37999, then to reference the routine use MUSIC = 38000 and third the variable TIMBRE must be changed to something else because in Applesoft it will conflict with TIME, since Applesoft only considers the first two characters in a variable name designation — I use the name REsonance for its descriptive value. Only use the RE portion in a program or "on" will be parsed as a command.

```
100  REM 000000000000000000
110  REM 0                  0
120  REM 0  MUSIC GRABBER   0
130  REM 0     CREATOR      0
140  REM 0       BY         0
150  REM 0  JOHN A. OAKEY   0
160  REM 0                  0
170  REM 0                  0
180  REM 0                  0
190  REM 000000000000000000

500 D$ =  CHR$ (4): PRINT D$"OPEN
      MUSIC GRABBER"
510  PRINT D$"WRITE MUSIC GRABBER
     "
520  PRINT "CALL-151 "
530  PRINT "9470<F17.FFBM"
540  PRINT "9474:07"
550  PRINT "9479:08"
560  PRINT "947D:09"
570  PRINT "948E:06"
580  PRINT "9493:08"
590  PRINT "9497:09"
600  PRINT "94B0:06"
610  PRINT "94B8:06"
620  PRINT "94C0:06"
630  PRINT "94C2:07"
640  PRINT "94C8:06"
650  PRINT "94CA:06"
660  PRINT "94D2:09"
670  PRINT "94D6:08"
680  PRINT "94D8:06"
690  PRINT "94E1:08"
700  PRINT "94E5:09"
710  PRINT "9470:4C A7 94"
720  PRINT "9482:4C 85 94"
730  PRINT "9488:4C 8B 94"
740  PRINT "949C:4C 9F 94"
750  PRINT "94A2:4C A5 94"
760  PRINT "94AC:B9 EF 94"
770  PRINT "94BB:B9 EF 94"
780  PRINT "94C4:B9 EF 94"
790  PRINT "94DD:4C E0 94"
800  PRINT "94EA:4C ED 94"
810  PRINT D$"CLOSE"
```

And Furthermore

The short Applesoft program in listing number two demonstrates the required parameters and how they are manipulated to play a song. In case you don't have the *Programmer's Aid #1* manual handy, here is a list and brief description of the parameters and how they are applied.

Variables: PItch = 767 [$2FF]
TIme = 766 [$2FE]
REsonance (replacing TIMBRE) = 765 [$2FD]

These locations hold the values which determine the note played when you CALL MUSIC. MUSIC is the first byte at 38000 [$9470] of the relocated machine language routine which produces the note.

There are fifty notes available with values from 1 to 50. Setting PI = 0 (same as PITCH = 0 as far as Applesoft is concerned) produces a rest. The value 32 is (approximately) middle C. The time of a note can be set to any value between 1 — the shortest — and 255 — the longest. There is no way to adjust tempo other than by the "base" time which you select for notes before writing a selection. (New program idea?) For example, in the demo program T = 45 was selected as a quarter note and then all other notes were computed proportionately.

The manual says that there are five TIMBER (REsonance) values available: 2, 8, 16, 32 and 64. It also explains — and your experimentation may verify as mine did — that there is not a lot of difference between them except that 32 is the one which works best on the high and low ends of the scale. For all intents and purposes, we could just put a POKE 765,32 at the beginning of a program and ignore REsonance from that point on.

How It Does What It Does

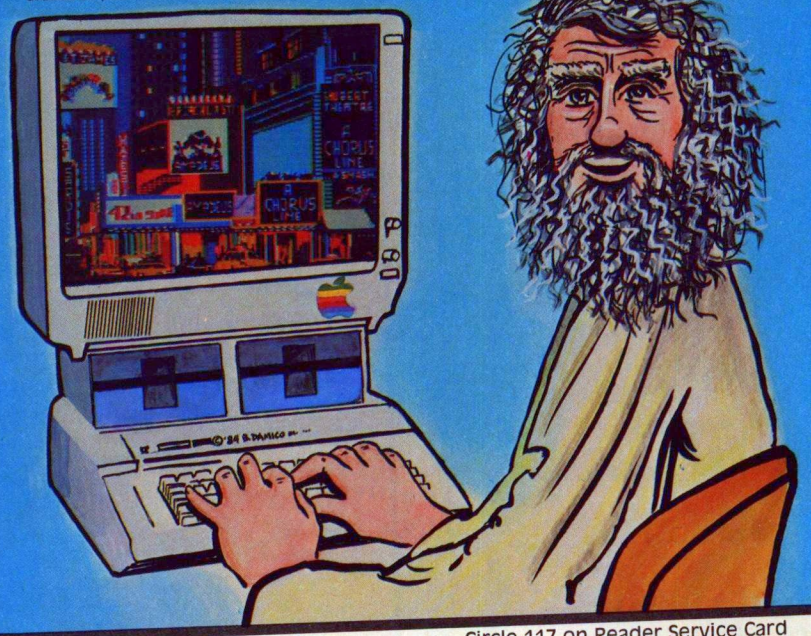
In ROM (Read Only Memory) Integer Basic occupies approximately the same space as Applesoft — 53248 to 65535 or if you're into hex, $D000 to $FFFF. If you are fortunate enough to have an Apple Language Card or a 16K RAM card in slot #0, the DOS 3.3 System Master HELLO program will load the language not resident on your motherboard into that area on boot up. Languages are nothing more than big machine language programs, which means that those programs must be available on the DOS 3.3 System Master.

CATALOG your System Master and you'll see it right there — INTBASIC. Not only does that "image" contain the original Integer Basic language but also the *Programmer's Aid #1* routines. By loading INTBASIC at $800 — the space where Applesoft programs normally start — we have it in RAM at a place where we can manipulate it.

The familiar CALL -151 puts the EXEC program into the monitor and the next line, 9470<F17.FFBM, is a command to the monitor that says take the byte-for-byte data that is found between locations $F17 and $FFB and recreate an exact duplicate of it beginning at location $9470 (that's 38000 decimal). In a blink of a machine language eye, we have the routines just where we're going to want them — way up in high RAM just under DOS so that when HIMEM: 37999 is set they will be protected and out of the way without using up too much memory.

Leonardo Da Vinci Would Have Loved
DOUBLESTUFF Plus T.M.
designed by Louis Bonfiglio

Shown here: Actual inset of artwork done using doublestuff plus™ Software on an Apple IIe.



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The routines are still not usable, however, until we make a couple of simple changes to make them compatible with Applesoft and happy in their new location. Gary Shannon wrote the music routines independent of any other Integer Basic coding which is basically why they can be transported to Applesoft so easily. There are only two types of changes that have to be made, and you should be able to quickly identify them by looking at the MUSIC GRAB CREATOR listing.

Four zero page locations were utilized in the original Integer Basic routines: $00, $01, $02 and $03. A look at the Zero Page Memory Maps on pages 74–75 of the Apple][Reference Manual will show the problem. Those locations are not used in Integer Basic, but they are used in Applesoft — for more information see page 127 of *Call -A.P.P.L.E.* In Depth. A few bytes up, however, locations $06, $07, $08 and $09 are available. The first type of change that we must make then is to substitute these values where appropriate.

The second type of change is simply to adapt the program to its new location. Assembly Language terms for the machine language notations that you see in the MUSIC GRAB CREATOR program include a JMP and a JSR command which are very much like BASIC's GOTO and GOSUB commands, respectively. We must change the addresses to which these commands direct the program flow so that they go to the same relative place within the program that they did when the routines were higher up in ROM.

Why Stop Here?

Once having GRABbed the routines, the opportunities for variations on our theme are considerable. One such opportunity — a tempo change — has already been suggested. If somebody doesn't come up with an Amper-Music, I'm going to be sorely disappointed. There's even a convenient place to put it (how far sighted of us). The music routines start at 38000 ($9470) and are 229 bytes long. DOS occupies the space down to 38400 ($9600). That means there are an additional 171 bytes beginning at $9556 just waiting for your programming virtuosity. Enjoy!

Listing 2

```
100  REM OOOOOOOOOOOOOOOOOOO
110  REM O   MUSIC DEMO     O
120  REM O                   O
130  REM O        BY         O
140  REM O                   O
150  REM O   JOHN A. OAKEY   O
160  REM O                   O
170  REM O                   O
180  REM O                   O
190  REM OOOOOOOOOOOOOOOOOOO


200  TEXT : HOME : CLEAR
210  HIMEM: 37999
220 D$ =  CHR$ (13) +  CHR$ (4)
230  PRINT D$"BLOAD MUSIC ROUTINE
     S"
240 MUSIC = 38000
250 PITCH = 767
260 TIME = 766
270 RE = 765: REM  RESONANCE
275  POKE RE,32
280  GOTO 510
290  POKE PITCH,P: POKE TIME,T: CALL
     MUSIC: RETURN
500  REM  *** NATIONAL ANTHEM ***

510 P = 32:T = 45: GOSUB 290
520 P = 29: GOSUB 290
530 P = 25:T = 90: GOSUB 290
540 P = 29: GOSUB 290
550 P = 32: GOSUB 290
560 P = 37:T = 180: GOSUB 290
570 P = 41:T = 45: GOSUB 290
580 P = 39: GOSUB 290
590 P = 37:T = 90: GOSUB 290
600 P = 29: GOSUB 290
610 P = 31: GOSUB 290
620 P = 32: GOSUB 290
630  END
```

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A Shortcut to Music Programming in Applesoft

Dave Kelly

PROGRAMMING music with Applesoft is by no means easy. It requires either the brute force method (as demonstrated in the Applesoft tutorial (#A2L0018) pgs. 79–83), or some kind of shortcut. My favorite shortcut is one of the music synthesizer boards now available. In the meantime, while we save up our pennies, we can make use of what we already have.

Just about the time I purchased my Apple][+ in 1979 (REV. 7), I also purchased the Integer Firmware card. Now I could have Integer BASIC anytime I wanted without having to buy the PASCAL Language card system. I was pleased to find that the Integer Firmware board included the Programmer's Aid #1 (PA#1), which is the ROM located in the D0 position of the board. Those with Integer BASIC Motherboards may find an empty socket at D0 unless they purchased the Programmer's Aid #1. Included in the PA#1 routines is the shortcut which makes programming music a breeze.

Here's the catch. When programming in Applesoft, the Integer BASIC routines, including PA#1, must be turned off because they occupy the same addresses as the Applesoft ROMs. This applies to Integer BASIC as loaded in the 16K RAM as well as ROM. The PA#1 routines are included on the DOS 3.3 System Master when Integer BASIC is loaded. The second problem is that the music routines use zero page locations $0, $1, and $2. Even if we could use the routines, Applesoft also uses these same zero page locations (see Apple Ref. Manual pg. 74 or *IIe* Ref Manual pg 66).

One solution might be to relocate the routines somewhere else. We would then have to decide where a good location for the routines is, because the routines use about 257 bytes. Starting at $300 is no good, as the routines would overlap the DOS vectors at $3D0. Where else can we put it, then? Since the routines already exist in the PA#1, let's use it.

Now we need to interface Applesoft to the PA#1. First, store away whatever might be in the zero page locations in temporary memory locations. Next just turn on the RAM card (or Firmware card, or wherever you have Integer BASIC). The routine then checks to see if Integer is actually loaded and if there is a PA#1. The switch addresses for RAMON and RAMOFF should be reversed for Integer in Motherboard ROM and Applesoft in a 16K card or firmware card. If you have the Applesoft firmware card, I suggest that you switch the ROMs on the firmware card for the Motherboard ROMs, since most of the software out now requires Applesoft. All that is left is to CALL the PA#1 music routine located at $D717. After the PA#1 does its thing, we turn off the RAM card, restore the zero page locations and return to our calling program.

To use the routine, first load Integer BASIC into your language card. If you use a firmware card, be sure that the address to turn on and off the RAM is set to the slot in which the firmware board resides. (I use mine in slot 4, but since not everyone has firmware cards, the routine references the language card locations. Before playing a note, the computer needs to know the pitch (how high or low a note), the duration (how long a time the note should be), and timbre. Timbre refers to the quality of the sound. The pitch is stored at location 767, the time at 766 and the timbre at location 765 (all locations are decimal). The routine is called from your Applesoft program by CALLing location 768.

Set up a few constants before starting to make things easier:

```
MU = 768 MUsic entry point
PI = 767 PItch
TI = 766 Time
TB = 765 TimBre
```

There are 50 notes available, numbered from 1 to 50. The statement POKE PI,32 will set up the pitch to produce (approximately) the note middle C. Increasing the pitch value by one increases the pitch by a semitone. POKE PI,33 would set up the pitch to produce the note C sharp. Just over four chromatic octaves are available. The value of 0 for the pitch indicates a rest (silence) rather than a pitch.

The duration of the note is set by POKE TI,t, where t is a number from 1 to 255. The higher the number, the longer the note. If t = 170 the notes will be approximately one second long. According to the PA#1 manual, to get notes at a metronome marking of MM, use a duration of 10200/MM. For example, to get 204 notes per minute use the command POKE TI, 10200/204.

There are five timbres available, coded by the numbers 2, 8, 16, 32, and 64. They are not very different from one another. With certain timbres, a few of the extremely low or high notes do not give the correct pitch. Since a timbre of 32 does not have this problem, use POKE TB,32.

When the pitch, time and timbre have been set, use the statement CALL MU (or CALL 768) which will cause the specified note to sound.

(Continued on page 57)

Eighteenth Century

Dice Music Games

William K. Dolen

YOUR computer and its music synthesizer can help you indulge in a hobby popular two hundred years ago — automatic music composition. The decline in predominance of intricate polyphonic styles of composition and the popularity of music composed in the melodic style galant placed the art of composition well within the grasp of amateur musicians of the eighteenth century. The dance forms of the period were easy to master, and even the most famous composers used combinations of common musical idioms (often in an uncommon way) to enable them to keep up with the incessant demand for new music. Relatively little talent or formal instruction was required to achieve mediocrity, and many treatises describing use of these idioms were published solely for the benefit of amateurs lacking sufficient musical imagination to invent melodies of their own. Nowhere are these idioms more exploited than in the so-called "dice music" compositions written, often by well known musicians, for the would-be composer with absolutely no knowledge of theory or composition. No fewer than seventeen of these appeared over a period of fifty years in numerous editions and languages.

Minuets, Polonaises, Church Music, Counterpoint

In 1757, Johann Philipp Kirnberger, a pupil of J.S. Bach still noted for his other works, published "Der allezeit fertige Menuetten- und Polonoisenkomponist" (The Always Available Minuet and Polonaise Composer). Using this pamphlet, a rank amateur with no knowledge of music theory could write a keyboard minuet with trio, or a polonaise, by using dice to select measures randomly from a prefabricated table. A similar method of composition by the respected composer Maximillian Stadler appeared in Paris about twenty years later, and was subsequently arranged, perhaps by Franz Joseph Haydn, for two violins, or flutes, and bass as the "Gioco Filharmonico," producing minuets with trios, and published in Naples in 1793. Other systems of chance composition involved random numbers (CPE Bach, 1757) or cards (Wiedeburg, 1788). The latter system resulted in 36 measure preludes suitable for keyboard practice and also intended for use by church organists. Bach's method uses apparently "vertical" methods to produce six measures of two-part invertible counterpoint.

Mozart's Musikalisches Wuerfelspiel

Certainly, the most famous of the dice music compositions is the "Anleitung zum Componieren...," published in 1793 and attributed to W.A. Mozart. The "Anleitung," or "Musikalisches Wuerfelspiel" (Musical Dice Game) as it is better known, provided its users with a nearly endless number of different waltzes, all sixteen measures long, all in A-B form, all with the same harmonic structure, and all typical of the style galant with its particular musical idioms. More than 600 trillion of these exist, some sounding better than others, and another version of the work will produce 600 trillion more contredanses — certainly, to quote Leonard Ratner, more than enough music to occupy the entire population of eighteenth-century Europe for a lifetime. Both of these exist in modern editions.

Did Josephine toss dice while Napoleon was at Waterloo?

The most elaborate dice composition I have located is "L'Art de Composer de la Musique Sans en Connaitre les Elemens" (The Art of Composing Music Without Knowledge of the Principles) by Antonio Calegari (1757-1828), dedicated to Madame Bonaparte, and published in Paris in 1802. Calegari was a celebrated Paduan theorist and teacher who primarily composed church music. The book contains 108 pages of dice tables, measures, and careful instructions, enabling one to compose an extended work in multiple movements, ending with a complete French rondeau in several sections.

The Dilettante Computer

It is inevitable that a computer would be employed to save humans the drudgery of tossing dice, finding and copying measures, and performing the resulting piece. Indeed, the Mozart Wuerfelspiel was first performed by Caplin, on a Ferranti Mark computer, in the 1950's. A few years later, T.H. O'Beirne, a mathematician in Glasgow, Scotland, also programmed an early computer to play the Mozart Wuerfelspiel. His results were disseminated on a long playing record which has become something of a collectors' item. To my knowledge, no one has written about adapting the dice games for use with microcomputers. Such adaptations are also inevitable, since most machines, like

the Atari 800 or the new Macintosh, have built-in music synthesizers and others, such as the Apple II, can have synthesizers installed. My Apple][+ equipped with the Mountain Hardware Music System (a polyphonic hardware digital music synthesizer) and Passport Designs' Soundchaser System, [*Ed.note: See descriptions of these systems elsewhere in this issue*] has enabled me to compose and play the Mozart waltzes and Haydn minuets in seconds, and will someday produce a Calegari rondeau on request. Listening to these pieces is a startling experience, for one is hearing a unique piece which, if not saved to disk, is not likely ever to be heard again.

Musical Crapshooting

Composing dice music with the Soundchaser system is quite easy. The Haydn "Gioco Filarmonico" creates sixteen measure minuets in three part polyphony from a "library" of 176 possible measures, and I will use it as an example. The "Wavemaker" feature of Turbo Traks (or the Four Track performance software) is written in BASIC, and can be deleted to make room for a lookup routine without disturbing the rest of the program. Having discovered the hexadecimal code which Soundchaser uses to control the Music System boards (unfortunately, the "Four Track" and "Turbo Traks" codes are different), I manually translated the 176 measures of the Haydn "Gioco" and entered them from the monitor into a free area of memory. I then constructed, as a two dimensional array, a lookup table which locates the starting note of a given measure, when addressed with a dice throw number (2–12) and a minuet measure number (1–16). To compose a minuet, the lookup routine "tosses the dice" using the RND function, locates the appropriate measure in the 176 measure "library," and transmits it to an area, starting at HEX $6B40, where Turbo Traks expects to find music. The process repeats fifteen more times; then control returns to Turbo Traks, which does not care that the music wasn't entered from the Soundchaser keyboard. Hitting the space bar plays the new minuet on my stereo system.

Adapting dice music for performance on other synthesizers shouldn't be too difficult. The Calegari pieces are in five part polyphony, but most of the others are in two or three parts. Ideally, the lookup routine should be written in machine code; BASIC is fine, of course, but is slow. I unraveled the "Turbo Traks" code by entering notes of known pitch and duration with the Soundchaser keyboard, and doing memory dumps to see how the notes had been translated. When working with other synthesizers, first try to get the manufacturer to give you the technical information you need. Translating and entering the "library" measures is quite laborious, but need only be done once. The dice pieces themselves come with tables which relate dice throw to measure number. I am convinced that the Macintosh, with suitable programming, should be able to play dice music via the polyphonic (four part) sound port.

More difficult is the problem of locating copies of the dice music pieces. Only the Mozart ones come in

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modern editions. Some are lost; others are located only in the archives of the world's great music libraries. Of particular help in my research have been The Stanford University Library, Palo Alto; Isham Memorial Library, Cambridge; The Newberry Library, Chicago; Bibliotheque Royale Albert 1er, Brussels; Zentralbibliothek, Zurich, and Gesellschaft der Musikfreunde, Vienna.

Conclusion

These little works anticipate contemporary aleatory methods of composition by almost 200 years. Indeed, John Cage and Lejaren Hiller have used the Mozart Wuerfelspiel in one of the solo parts of their composition, HPSCHD. One must remember that, although these dice pieces are not serious music for the concert hall, the better ones could be rewritten into a pleasant, short piece because their framework is solid and the music is based on valid eighteenth century musical idioms. Thus, it is fair to say that the computer is indeed capable of a kind of musical composition if one doesn't expect anything original. It wouldn't be very difficult for a twentieth century composer to design his own structure, write measures for it, and use these same combinatorial methods to produce a finished piece, perhaps of substantial merit. I have heard of (but not actually heard) a "ragtime" dice game. Sousa marches are also highly idiomatic and might lend themselves to a dice music parody. I welcome correspondence from readers who would like to learn more about dice music.

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Chance Music Compositions

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Calegari, Antonio, L'art de composer de la Musique Sans en Connaitre les Elemens, Paris, Boudin, 1802.

Catrufo, Giovanni, Bareme musical, ou l'art de composer la Musique sans en connaitre les principes par J.A.S.C., Paris (Colas), 1811.

Fielder, C.H., Musikalisches Wuerfelspiel oder der unerschoepfliche Ecossaisen–Componist, Hamburg, 1801.

Fischer, Ludwig, Musikalisches Wuerfelspiel oder Kunst, durch Wuerfel Kindern (–und auch Grossen!) leicht und auf angenehme Weise die noten im Violin– und Bass–Schluessel zu lehrnen, Weimar (Wentzel).

Graf, J.C., Musikspiel oder Tabelle, unzahlige Maersch fuer Pianoforte oder andere Instrumente mittlest Wuerfel zu erfinden, Mainz (Schott).

Haydn, Franz Joseph, Gioco filarmonico, o sia maniera facile per comporre un infinito numero di minuettie trio anche senza spaere il contrapunto, Naples (Marescalchi), 1793.

Hayn, Friedrich Gottlob, Anleitung mit Wuerfel Anglaisen zu componieren, Dresden, 1798.

Hoegi, Piere, A Tabular System Whereby the Art of Composing Minuets is made so Easy that Any Person without the least knowledge of Musick may compose ten thousand, all different, and in the most Pleasing and Correct Manner, London (Welcker), 1770.

Kirnberger, Johann Philipp, Der allezeit fertige Minuetten– und Polonoisenkomponist, Berlin (Winter), 1757.

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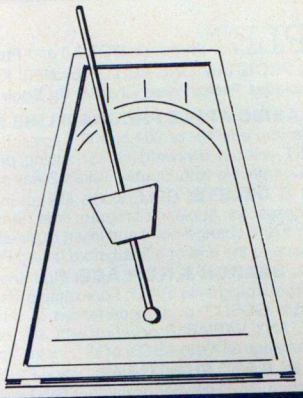
METRONOME



Jack Bender

Where would music lessons be without the incessant regularity of a metronome? This clever program provides yet another good use for your Apple.

THIS HIGH resolution graphics program simulates a metronome. The pendulum swings (and beeps) at any tempo between 40 and 208 beats per minute. Any keypress interrupts the cycle, giving the user the option to enter a new tempo or exit the program. The program is modular. Four subroutines are called at 1000, 2000, 3000 and 4000. Most of the time, program control centers around a loop from line 140 to 210. End of the main block is at 230.

Here's a brief outline of the program's critical parts:

100 Tempo data is read into an array A(208). This data is used in a pause loop to produce a specific tempo. Array element A(40) contains the pause between beats for 40 beats per minute. A(120) contains the pause between beats for 120 beats per minute.

120 The metronome outline and tabletop are drawn.

150–152 If no keypress is detected, the pendulum is drawn and a beep sounds. A keypress causes interruption of the loop and control is passed to line 4000. At this point, a new tempo may be set.

170 & 190 The use of variable X allows the use of the same subroutine to draw the pendulum in two different places.

4070 To limit typing and reading data statements, only data for even tempos are entered. Odd tempo data is averaged between two adjacent even tempos.

```
10  REM ************************
15  REM
20  REM  JACK BENDER HASTINGS,MI
25  REM
30  REM  HGR METRONOME
40  REM
50  REM  TEMPOS 40 - 208
60  REM  PRESS ANY KEY TO
70  REM  CHANGE SELECTION
80  REM
90  REM ************************
91  HOME : TEXT : CALL  - 3086
95 :
96 :
100  REM *** LOAD TEMPO DATA ***
110  GOSUB 1000
115 :
116 :
120  REM *** DRAW METRONOME ***
130  GOSUB 2000
132 A$ = "T": GOSUB 4040
135 :
136 :
140  REM *** KEY PRESS TEST ***
145  REM *** SET TEMPO/QUIT ***
150 Z =  PEEK ( - 16384): POKE  -
     16384,0
151  IF Z < 128 THEN  GOTO 160
152  GOSUB 4000
155 :
156 :
160  REM  *** MOVE PENDULUM ***
170 X = 0: GOSUB 3000
180  REM  *** MOVE PENDULUM ***
190 X = 1: GOSUB 3000
195 :
196 :
200  REM *** LOOP ***
210  GOTO 140
220  REM *** END MAIN PROGRAM ***
230  END

1000  REM *** DATA SUBROUTINE ***

1001  REM  *** USED FOR TEMPOS **
     *
1002  DIM A(209)
1004  FOR T = 40 TO 208 STEP 2
1006 :: READ A(T):A(T + 1) = 0
1008  NEXT T
1010  DATA  1000,950,900,850,800,
     756,713,670,645,620,595,570,
     550,530,510,490,468,447,426
1020  DATA  409,391,374,363,352
     ,341,330,317,304,291,282,274
     ,266,258,250,243,236,230,223
     ,217,211,205,199,193
1030  DATA  188,183,178,173,168
     ,165,162,158,154,150,147,144
     ,141,137,133,129,125,122,119
     ,116,113,110,106,103,100,98
1035  DATA  95,92,90,88,85,8
     2,80,78,76,74,72,70,68,66,64
     ,62
1040  RETURN
1050 :
1060 :
2000  REM  *** DRAW METRONOME ***

2002  REM  ***  SUBROUTINE  ***

2020  HGR : HCOLOR= 3: HPLOT 126,
     54 TO 105,138 TO 177,138 TO
     162,54 TO 126,54
2030  HPLOT 126,54 TO 135,48 TO 1
     71,48 TO 162,54: HPLOT 177,1
     38 TO 189,129 TO 171,48
2040  HPLOT 132,114 TO 156,114: HPLOT
     0,111 TO 111,111: HPLOT 185,
     111 TO 279,111
2050  HPLOT 144,114 TO 129,72
2070  RETURN
2080 :
2090 :
3000  REM *** MOVE PENDULUM ***
3010  REM ***  SUBROUTINE  ***
3020  HCOLOR= 0: HPLOT 144,114 TO
     129 + (X = 1) * 30,72
3030  HCOLOR= 3: HPLOT 144,114 TO
     159 + (X = 1) * ( - 30),72
3040  CALL  - 1052: REM  BEEP
3050  FOR R = 1 TO PAUSE: NEXT R
3060  RETURN
3075 :
3076 :
4000  REM  *** KEY PRESS ***
4005  REM  *** QUIT OR NEW TEMPO
     ***
4010  VTAB 22: CALL  - 868: PRINT
     "       SET TEMPO OR QUIT (T
      OR Q) ?";: GET A$: PRINT
4020  IF A$ <  > "Q" AND A$ <  >
     "T" THEN  GOTO 4010
4030  IF A$ = "Q" THEN  POP : GOTO
     220
4040  VTAB 22: CALL  - 868: INPUT
     "          WHAT TEMPO (40 -
     208)? ";T$:T =  INT ( VAL (T
     $))
4050  IF T < 40 OR T > 208 THEN  GOTO
     4040
4060 PAUSE = A(T)
4070  IF PAUSE = 0 THEN PAUSE =  INT
     (A(T - 1) + A(T + 1)) / 2
4080  VTAB 22: CALL  - 868: PRINT
     "                TEMPO = ";T

4090  RETURN
```

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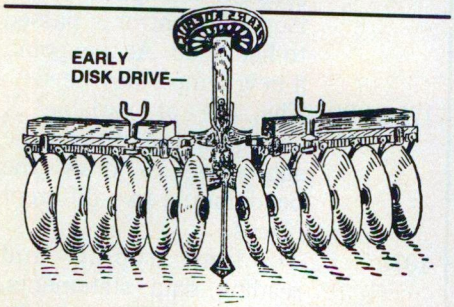


☐ BEAGLE BASIC™ (REQ. 64K)

APPLESOFT ENHANCER by MARK SIMONSEN
$34.95: Includes Peeks/Pokes Chart & Tip Book #6

RENAME ANY APPLESOFT COMMAND or Error Message to anything you want. For program clarification, encryption/protection or even foreign translation. Example:

10 POUR X=1 TO 3: ECRIVEZ "BONJOUR": ENSUITE

RAM Applesoft is *better* Applesoft! Beagle Basic replaces those obsolete cassette commands (SHLOAD, etc.), with powerful new commands that you can USE—

ELSE follows Applesoft If-Then statements, like this:

IF X=2 THEN PRINT "YES": *ELSE* PRINT "NO"

HSCRN reads the color of a hi-res dot for collision testing, **SWAP** exchanges variable values, **TONE** writes music without messy Pokes or Calls, **SCRL** scrolls text in *either* direction, **TXT2** lets Text Page 2 act exactly like Page 1...

GOTO AND GOSUB may precede variables, as in "GOSUB FIX" or "GOTO 4+X". Escape-mode indicated by a special ESCAPE CURSOR. Replace those awkward Graphics screen-switch pokes with one-word commands. Change your ctrl-G Beep to any tone you want. **INVERSE REM STATEMENTS** too! GPLE/Double-Take compatible.

☐ DOS BOSS™

DOS 3.3 EDITOR by BERT KERSEY & JACK CASSIDY
$24.00: Includes Peeks/Pokes Chart & Tip Book #2

RENAME DOS COMMANDS and Error Messages—DOS 3.3's "Catalog" can be "Cat"; DOS's cryptic "Syntax Error" can be "Oops" or almost *anything* you want it to be.

PROTECT YOUR PROGRAMS. Unauthorized Save-attempts can produce "Not Copyable" message, or *any* message. **List-Prevention** and other useful Apple tips and tricks. Plus one-key program-execution from catalog.

CUSTOMIZE DOS. Change Disk Volume headings to your message or title. Omit or alter catalog file codes. Fascinating documentation, tips & educational experiments.

ANYONE USING YOUR DISKS (booted or not) will be forced to use DOS formatted the way YOU designed it.

☐ DOUBLE-TAKE ← DOS 3.3 ↙ ProDOS
☐ DOUBLE-TAKE/PRO™

2-WAY SCROLL/MULTI-UTILITY by MARK SIMONSEN
$34.95: Includes Peeks/Pokes Chart & Tips Chart #1

2-WAY SCROLLING: Listings & Catalogs scroll Up *and* Down, making file names and program lines easier to access. Change Catalog or List scroll-direction with Apple's Arrow keys. Machine Language and Hex/Ascii dumps scroll two-ways too. All features support 80-column display.

BETTER LIST FORMAT: Each Applesoft program statement lists on a new line for *FAST* program tracing & de-bugging. Printer-compatible in any column-width.

```
A$="DOGFOOD"
X=3.14159
Y=255
```
← **VARIABLE-DISPLAY:** prints all of a program's strings and variables with their current values.

```
A$: 100 200 250
X: 10 20 3000
Y: 10 40 55 60
```
← **CROSS-REFERENCE:** Sorts & displays line numbers where each variable & string appears.

AUTO-LINE-NUMBER, instant Hex/Dec Converter, better Renumber/Append, Program Stats, Eliminate/Redefine Cursor, Free Space-On-Disk... All GPLE/Pronto compatible.

2-WAY VIDEO SCROLLING

```
]LIST
10 HGR2
   : FOR Y=0 TO 191
   : POKE 228, C
   : C=C+1/9-256*(C=255)
20 REM "Double-Take
   optionally lists each
   Applesoft program
   statement on a new
   line, making pro-
   gram code much
   easier to read."
30 HPLOT 0,Y TO 279,Y
   : NEXT Y
   : POKE 2053,58
   : GOTO 10
```

High-Speed DOS

☐ PRONTO-DOS™

HIGH-SPEED DOS/DOS-MOVER by TOM WEISHAAR
$29.50: Includes Peeks & Pokes Chart

TRIPLES THE SPEED of disk access and frees 10,000 bytes of extra programmable memory by moving DOS 3.3.

Function	Normal	Pronto
BLOAD HI-RES IMAGE	10 sec.	3 sec.
LOAD 60-SECTOR PROGRAM	16 sec.	4 sec.
SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.

(Text-files no change) **Bload language cards** at *triple speed.* Create bootable high-speed disks with the normal INIT command. Compatible with *all* commands, GPLE, Double-Take, DOS Boss, DiskQuik & most unprotected programs.

MOVE DOS 3.3 above main memory to free *10,000 bytes* of memory for your programs (64K required to move DOS).

15 EXTRA SECTORS per disk. Catalog Free-Space is displayed on the screen every time you Catalog a disk.

NEW TYPE-COMMAND ("TYPE filename") prints the contents of any Text File on-screen or to your printer.

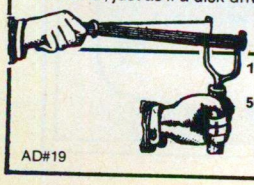
☐ DISKQUIK™ (Requires IIe with 128K)

DISK EMULATOR by HARRY BRUCE & GENE HITE
$29.50: Includes Peeks & Pokes Chart
Requires IIe with EXTENDED 80-column card (128K)

ACTS LIKE A DISK DRIVE in Slot 3, but super-fast and silent! Enjoy many of the benefits of another drive at 1/10th the cost. Catalog with "CATALOG, S3" command. Access all kind of files in RAM with normal DOS commands.

SILENT AND FAST: Since no moving parts are involved, DiskQuik operates at super-high speeds. See to believe! Your Apple IIe's Extended 80-column Card (required) holds about half the amount of data as a 5¼" floppy!

MANY USES: For example, load often-used files like FID into RAM when you boot up, so they are always available when you need them. Copy files from RAM onto disk and vice versa, just as if a disk drive were connected to slot #3.



COMPATIBLE with all normal DOS procedures.

```
1234 TEXT: HOME: NORMAL:
     PRINT CHR$(21)
5678 R=INT(RND(1)*10): N(R)=
     N(R)+1: VTAB R+9: HTAB
     40: PRINT CHR$ (124); SPC
     (N(R)); CHR$(R+65); :
     IF PEEK(36) THEN 5678
```

AD#19

Multi-Utilities

☐ UTILITY CITY™

21 PROGRAMMING UTILITIES by BERT KERSEY
$29.50: Includes Peeks/Pokes Chart & Tip Book #3

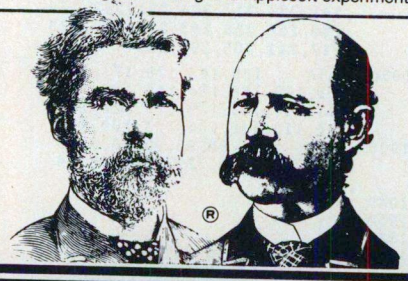
LIST FORMATTER prints each Applesoft program statement on a new line. For-Next Loops are indented with printer Page Breaks. A great Applesoft program de-bugger.

MULTI-COLUMN CATALOGS to your printer, with or without sector and file codes. Organize your disk library.

INVISIBLE AND TRICK catalog File Names. Put invisible functioning commands in Applesoft programs too.

21 UTILITIES TOTAL, including auto-post Run-number & Date in programs, alphabetize/store info on disk, convert dec to hex or Int to FP, protect and append programs, dump 40-column text to printer. And More.

LEARN PROGRAMMING TRICKS: LIST-able programs and informative documentation. Includes Tip Book #3— Hours of good reading and Applesoft experiments.



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Micro Software Inc.

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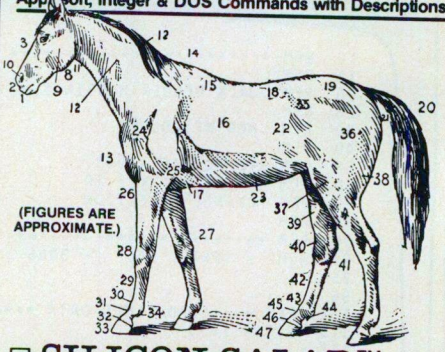
SAN DIEGO, CA 92110 / 619-296-6400

Attention Appliers: Most Apple dealers and software stores have Beagle Bros products on their shelves. If you can't find the disk you want, bug the manager—he can have *any* of our products in his store for you within a couple of days.

FREE APPLE COMMAND CHART: Each SILICON SALAD and TIP DISK #1 comes with an 11x17 poster of all Applesoft, Integer & DOS Commands with Descriptions.



☐ SILICON SALAD™

WITH TIP DISK #2 by BERT KERSEY & MARK SIMONSEN
$24.95: With Peeks/Pokes Chart & Apple Command Chart

MANY MINI-UTILITIES: Program Splitter makes room for hi-res pix in large Applesoft programs, **Disk Scanner** finds bad disk sectors, **Key-Clicker** adds subtle sound as you type, **DOS-Killer** adds two tracks of space to your disks, **2-Track Cat** allows up to 210 DOS 3.3 file names per disk, **Text Imprinter** converts text-screen text into hi-res text, **Onerr Tell Me** prints the appropriate error message but continues program execution, **Text Screen Formatter** formats and converts text layouts into Print statements... plus much more Apple wizardry from the boys at Beagle Bros.

MORE TIPS ON DISK: Over 100 programs from Beagle Bros Tip Books 5, 6 and 7; *and* from Tip Chart #1.

TWO-LINERS TOO: From our customers around the world—and elsewhere. New tricks for your old Apple!

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COMING JULY 84 Apple® Graphics Utilities

☐ BEAGLE GRAPHICS™

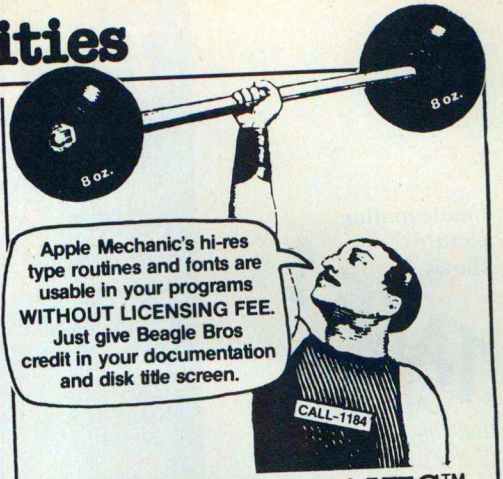
DOUBLE HI-RES GRAPHICS by MARK SIMONSEN
$59.95: Includes Peeks & Pokes Chart
Requires Apple IIc (or IIe with EXTENDED 80-col. card).

560-WIDE WITH 16 COLORS! Beagle Graphics gives your 128K-Apple (required) a full range of colors plus *double* high resolution—560 x 192 pixels. All Applesoft hi-res functions, including shape tables, are supported.
NEW COMMANDS let you draw fast circles, ellipses and rectangles from the keyboard or from your programs.
FAST COLOR FILL fills any outline with one of 16 solid colors or 256 color mixes (usable in your programs).
PROGRAM & PICTURE-CONVERTERS change your existing Applesoft programs *and pictures* to double hi-res. "Double-ize" *Apple Mechanic* shape table programs too!
DOUBLE-PLOT PROGRAM lets you draw and manipulate pictures in double hi-res. Add type to pix too. Move sections of images to either page. Save pictures to disk.
HI-RES TRICKS: Amazing stuff— any portion of a picture may be rotated, flopped, moved, inverted, superimposed, scrunched or even SAVED to disk. Saving image-portions conserves disk space.

☐ ALPHA PLOT™

STANDARD HI-RES GRAPHICS UTILITY
by BERT KERSEY & JACK CASSIDY
$39.50: Includes Peeks/Pokes Chart & Tip Book #4
(Alpha Plot offers 6-color 280-pixel resolution and requires only 48K; see Beagle Graphics for 128K double hi-res.)

DRAW IN HI-RES on both pages using easy keyboard commands. Pre-view lines before plotting. Use solid or mixed colors and Reverse (background opposite). One-keystroke circles, boxes and ellipses, filled or not. All pictures are Save-able to disk for access by your Applesoft programs.
COMPRESS HI-RES DATA to 1/3 disk-space, allowing 3-times the number of hi-res pictures per disk (avg. figures).
MANIPULATE IMAGES: Superimpose pictures or *relocate* sections of images anywhere on either hi-res page.
HI-RES TYPE: Add variable-size color & b/w text to your pictures. Type *anywhere* with no htab/vtab limits. Type sideways too, for Charts & Graphs. Includes Tip Book #4.



☐ APPLE MECHANIC™

HI-RES SHAPE EDITOR & FONTS by BERT KERSEY
$29.50: Includes Peeks/Pokes Chart & Tip Book #5

SHAPE EDITOR: Keyboard-draw hi-res shapes for animation in your Applesoft programs. Easy "List & Learn" Applesoft demos teach how to do hi-res animation as well as professional-looking hi-res Charts and Graphs.
HI-RES FONTS: Access & create proportionally-spaced hi-res type; each character totally re-definable. Six complete fonts are included on the disk (4 large & 2 small).
MORE: Useful music, text and hi-res tricks for your Applesoft programs. Clear educational documentation and step-by-step instructions for writing graphics programs.

☐ FLEX TYPE™

FLEXIBLE-TEXT UTILITY by MARK SIMONSEN
$29.50: Includes Peeks & Pokes Chart

PUT VARIABLE-WIDTH TEXT on both hi-res screens with normal Applesoft commands (including HTAB 1-70). Normal, expanded & compressed text with no extra hardware. (70-column text requires b/w monitor, not a tv).
COMBINE TEXT & GRAPHICS. Run existing Applesoft programs with Flex. GPLE/Double-Take compatible.
DOS TOOL KIT® font compatibility. Access up to 9 fonts in memory. Text editor lets you redesign text characters.

APPLE MECHANIC HI-RES ☐ TYPEFACES™

26 FONTS FOR APPLE MECHANIC by BERT KERSEY
$20.00: Includes Peeks & Pokes Chart

26 NEW FONTS for use with Apple Mechanic programs. Many different sizes and typestyles, both ordinary and *Artistic*. Every character—from A to Z to "★" to "□"—of every typeface—from "Ace" to "Zooloo"—is re-definable to suit your needs. All type is *proportionally spaced* for a more professional appearance. People *do* notice the difference!

COMING JULY 84

☐ TRIPLE-DUMP™

SINGLE/DOUBLE HI-RES "PRINT-ANYTHING" UTILITY
$39.95: Includes Peeks & Pokes Chart

PRINT ANY SCREEN IMAGE on your dot-matrix (graphics-capable) printer— Hi-Res, Lo-Res, **Double Hi-Res,** Medium-Res, as well as 40 **and 80-Column Text**. All print functions may be used in your Applesoft programs and disks. Don't settle for a "locked up" printer-dump program.
SPECIAL EFFECTS: Crop, rotate, enlarge, distort, invert... Preview pictures on the screen before you print.
BANNER MAKER: Make impressive 8"-high signs and banners for your family, home or office. Type any message—no length limit—and let your printer do the work!

☐ FRAME-UP™

FAST APPLE DISPLAY UTILITY by TOM WEISHAAR
$29.50: Includes Peeks & Pokes Chart

PROFESSIONAL PRESENTATIONS: Turn existing Hi-Res, Lo-Res & Text pix into Apple "slide shows". *FAST* 2½-sec. hi-res loading! Paddle or Keyboard-advance frames.
UNATTENDED SHOWS optional— each picture arranged and pre-programmed to display 1 to 99 seconds. Text Screen Editor creates black & white text "slides" ; lets you key-in type "live" during shows. Mail copies of presentations-on-disk to friends & associates (or home to Mom!).

Disk Librarian

☐ FATCAT™ NEW!

PERSONAL DISK LiBRARY by ALAN BIRD
$34.95: Includes Peeks & Pokes Chart

MULTIPLE-DISK CATALOG: FATCAT reads all of your DOS 3.3 and ProDOS disks into one or more "Master Catalogs" that can be searched, sorted and printed. Get organized, and find out what's *really* on all of those floppies!
ALPHABETIZE FILE NAMES: FATCAT lets you sort your DOS 3.3 and ProDOS disk catalogs alphabetically, by file name, type, etc., to make files easier to find. Once arranged, a new disk directory may be written to the disk, so your files are in the order you want when you CATALOG. This feature alone is worth the price of FATCAT!

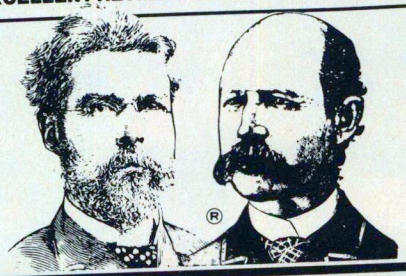
```
10 REM BEAGLE CARD FILE
20 HGR: HGR2: POKE 232, 120: POKE 233, 64: POKE
   16504, 7: SCALE=80: P=16: X=99: FOR R=0 TO 31:
   P=P*-1: POKE 230, 48+P
30 FOR Y=0 TO 1: ROT=ABS(64*Y-R): HCOLOR=3:
   FOR A=1 TO 25: DRAW 1 AT X+2*A, X: NEXT
40 HCOLOR=0: DRAW 1 AT X, X: ROT=32: DRAW 1:
   DRAW 1 AT X, X: NEXT Y, R
50 FOR A=0 TO 20: FOR B=0 TO 1: POKE 49237-B,0:
   X=PEEK(49200): FOR C=1 TO 6*A
60 NEXT C, B, A: GOTO 50
```

Beagle Bag!

☐ BEAGLE BAG™

12 APPLE GAMES ON DISK by BERT KERSEY
$29.50: Includes Peeks & Pokes Chart
Apple software customers recently voted BEAGLE BAG to Softalk's "Most Popular Software" list for 1983.

COMPARE BEAGLE BAG with any one-game locked-up disk on the market today. All 12 games are a blast, the price is right, the instructions are crystal clear, *and* the disk is COPYABLE. You can even *change* the programs or list them to learn programming tricks by seeing how they work.
TWELVE GAMES that *last*— TextTrain, Wowzo, Magic Pack, Buzzword, Slippery Digits, and many many more...
EXCELLENT REVIEWS—Read Jan-83 *Softalk*, pg.148.



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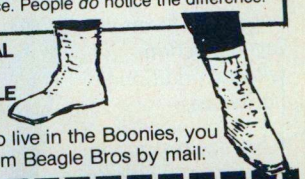
Attention Dealers: Beagle Bros products rank consistently high on software best-seller charts, and captured FOUR spots on *Softalk's* 1983 Top-30 Most-Popular List (all categories). Telephone any Apple software distributor for fast delivery.



GOTO YOUR LOCAL APPLE SOFTWARE STORE FOR BEAGLE BROS PRODUCTS.

Or, if you happen to live in the Boonies, you can buy directly from Beagle Bros by mail:

RUSH the following disks by First Class Mail:

☐ Alpha Plot	$39.50	☐ Fatcat	$34.95
☐ Apple Mechanic	29.50	☐ Flex Type	29.50
☐ A.M.Typefaces	20.00	☐ Frame-Up	29.50
☐ Beagle Bag	29.50	☐ GPLE	49.95
☐ Beagle Basic	34.95	☐ ProntoDOS	29.50
☐ Beagle Graphics†	59.95	☐ Silicon Salad	24.95
☐ DiskQuik	29.50	☐ Tip Disk #1	20.00
☐ DOS Boss	24.00	☐ Triple Dump†	39.95
☐ Double-Take/3.3	34.95	☐ Utility City	29.50
☐ Double-Take/Pro	34.95	☐	

†Available July 1, 1984

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Add $1.50 First Class Shipping, Any-Size Order.
Overseas add $4.00. COD add $3.00. California add 6%.
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Graphics processing that's easy, flexible and fun!

You don't have to be an artist or programmer, just select from Baudville's complete line of compatible graphics software. The possibilties are infinite.

Whether you've just started, or you're a seasoned hi-res hacker, you'll appreciate the unmatched power and simplicity of Baudville's graphics software.

Create motion picture shows.

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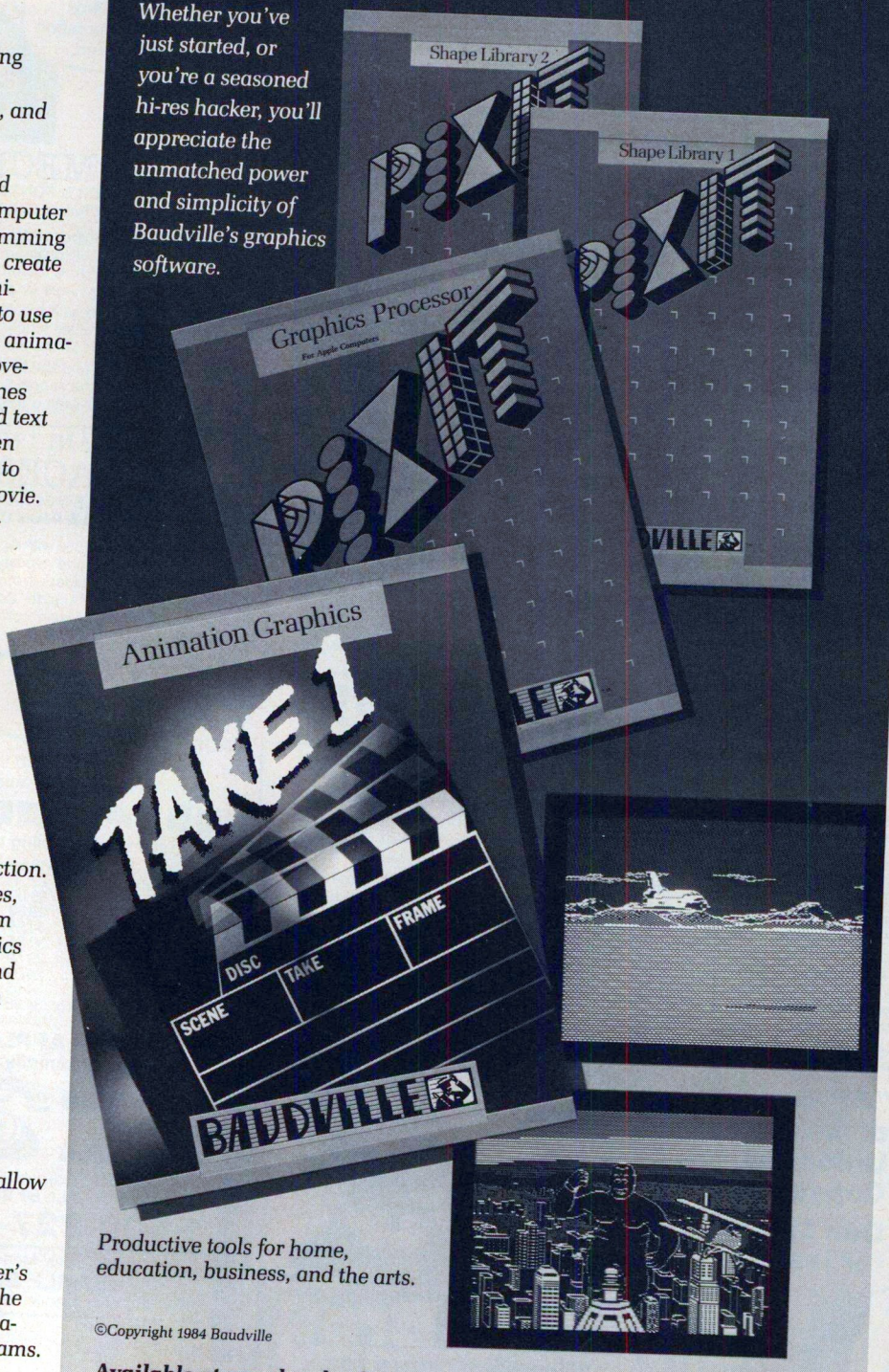
Stunning Animation that's fast, smooth, and flicker free!

Write, produce, and direct your own computer movies. No programming skills are needed to create superb full-color animation. With easy to use TAKE-1, you define animation shapes and movements, "shoot" scenes frame-by-frame, add text at any time, and then combine the scenes to make a complete movie. Perfect for presentations and demos.

Premiering:

- *True sprite capability for multi-layered action without additional hardware.*
- *No size restriction on animated objects.*
- *Complete editing at all stages of production. Can use hi-res pictures, shapes, and fonts from PIXIT or other graphics utilities for background scenes and animation shapes.*
- *A convenient selection of animation libraries are available.*
- *Moving objects can have "windows" that allow background to show through.*
- *Optional programmer's "tool kit" lets you put the power of TAKE-1 animation in your own programs.*

$59.95 Requires 64K



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The complete color graphics package.

PIXIT

Includes these integrated features:

Create A Shape
using simple keystroke commands.

Shape Table Editor
allows up to 128 shapes placed anywhere in table.

Shape and Font Library
provides a convenient selection of pre-drawn shapes and text fonts.

Picture Editor
creates hi-res pictures using mixed text and graphics, circles, lines, colorfill, and shape tables.

Slide Show
displays hi-res pictures like a slide projector.

Printer Dump
Supports a wide variety of dot matrix printers and interface cards. No additional software required.

Uses standard hi-res picture and Applesoft shape table files which are compatible with other graphics utilities.

Optional Shape Libraries
greatly reduce the time required to generate computer art. Each library contains a wide variety of artist drawn shapes for specific areas of interest.

$49.95 Requires 48K
Optional Libraries @$20 each.

For Apple II, Apple II+, Apple //e or compatible computers.

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Available at your local software store or direct from BAUDVILLE.
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Grand Rapids, Michigan 49506 Phone (616) 957-3036

BAUDVILLE

Circle 122 on Reader Service Card

ALF Music Card MC1

PRODUCT:	ALF Music Card MC1
USE:	Music output
FOR:	APPLE II, II+, IIe, III
COMPANY:	ALF Products, Inc. 1315F Nelson St. Denver, CO 80215
INCLUDES:	Firmware Software disk Audio Cable Manual
PRICE:	$169

ALF Music Card MC1

Dave Kelly

Lee Webster

RECENTLY, a friend asked me to help write a program to play music on his computer. He knew how to play one note at a time, but playing several notes at the same time had him confused. Although some software has attempted to imitate two voices at once, playing more than one note at a time on the Apple is extremely difficult....unless you have a synthesizer.

Although I have had an interest in music since playing trombone in high school and college, music is such an unprofitable career that I switched to Electrical Engineering. After a few frustrating attempts at writing music to play one note at a time, I came across the ALF Products MC1, a 9-voice music synthesizer board. This was my chance to mix my music interest with my electronics interest. The original synthesizer produced by ALF, the MC16, was a 3-voice synthesizer. Although the MC16 has slightly better musical qualities than the MC1, I feel that the MC1, with its 9 voices, is a better value.

Shaping Sounds with MC1

A program (ENVELOPE) for shaping envelopes and experimenting with the sounds is included with the MC1 software. The ATTACK, DECAY, SUSTAIN, RELEASE, VOLUME and GAP parameters determine what the waveform will sound like. With the MC1 card the sounds can be changed to give special effects, but if you are looking for a particular instrument sound—such as piano or violin—you may have trouble getting the exact sound you want without some experimentation. The sound that is produced resembles an organ because the output is basically square waves. The envelope commands listed above can change the sound drastically, and you can approach a certain level of sound control to get the effect you desire. If you want to be able to produce the whole orchestra of instruments, then there are other (more expensive) synthesizer cards which can do this.

Hardware Setup

The card may be plugged into any slot 0-7 (1-7 on Apple *IIe*). With the Apple *IIe*, the card may be plugged into slot 3 even when there is an 80-Col. card in the Aux. slot, because the MC1 has no built-in firmware. Anytime the slot is changed, a reconfigure program must be run to set up all the software to work with the chosen slot. Included with the card is software and a manual which "holds your hand" as you learn how to

(Continued on page 56)

WITH the ALF Music Card MC1 you can become a composer on your "mighty Apple" console at a reasonable price. I've been using the ALF card for about three years, and last year they released some updated software which makes it compatible with the Apple *IIe* and *III*.

Installation

In the MCS package, you get hardware, software and a manual. The hardware consists of a small (roughly 3x5") board to put in one of the empty slots in your Apple. You normally put it in slot 4 but you can adjust the software for a different slot. Once installed, you need to make a connection to your stereo system. The cable provided attaches to the ALF card and extends 4 feet to two standard RCA plugs. If you have your stereo system that close to your computer, you can plug directly into the Tape Playback jacks, or buy extension cords to extend the cable to your system. I use a 15 foot extension as my stereo is on the far end of the room. There doesn't seem to be any problem with signal loss over that distance. You also have to plug in your game paddles for data input. I've tried it with a joystick, but the paddles work much better.

Software "installation" is as simple as the hardware. It's a good idea to begin by making a copy of the diskette (unprotected) and work off the copy. On booting the disk the first time, you are presented with some questions (i.e. which slot the ALF card is in, whether you are using an Apple *III*, etc.). After responding, the computer takes over and configures the disk by storing a line (normally line 10) on each of 5 programs to identify the slot number and other details. This only takes a minute or two and does not have to be repeated every time you boot.

A Main Menu is given next—it will come up automatically on booting from here on. You have the choice of: reconfiguring the programs (for different slot, etc.), playing sample songs, running the PLAY program, running the ENTRY program (or ENTRY2 for Apple *IIe* users), or exiting to BASIC.

Sample Songs

The best bet for a beginner is to play the sample songs. This gives you a chance to get the proper settings on your stereo system and to appreciate the potential of this system.

The ALF disk contains six sample songs. Each is a different style of music and demonstrates a wide range of capabilities of the system. What you really have is a music synthesizer on the card. It produces 9 independent "voices" which you can "program"—actually you'll be entering the musical notation rather than programming in a computer language. These nine voices are split so that three will emerge from the left channel, three from the right and three from the middle when played on your stereo system. You have control over the sound of each voice by defining certain parameters.

According to the technical specifications, there are nine pitch generators, each of which can produce any frequency 63920/D Hz, where D can vary from 1 to 1023 (in integers). Volume settings are available with 16 settings over a 28 dB range. Pitches available, without transpose, are 55 half steps— with transpose, 145 quarter-steps (6 octaves starting at C, 2 octaves below middle C). This is approximately 65.4 to 4186 Hz.

The sample songs include: "Going Out of My Head" (a popular song of some years ago, which uses all 9 voices on the ALF card), "Dixie Boogie" (5 voices), "March of the Womp Rats" (not a top-10 favorite, but a good demonstration of the percussion possibilities), "Swingin in the Country," Haydn's Symphony #94 (Second Movement—shows the "serious music" voicing possibilities), and "Four Brothers" (the other sample using all 9 voices—this is a Woody Herman big band tune). These samples are all played automatically using the "album" feature.

During these songs, you get a lo-res graphics display with a horizontal band for each voice, and a box in the middle showing the location of middle-C. Another box on the line moves back and forth along the line in relation to the note being played. It changes color (or grayness on a B&W monitor) with the volume level changes of the voice. At the bottom of the screen are four text lines identifying the composer, programmer, or "executioner" (as one person titled himself).

These sample songs are fun, but the real fun comes when you write your own. There are 10 programs on the disk (including two versions of ENTRY) for you to work with. All but two (PERFORM and FLASH) are Applesoft BASIC files which you can look at and modify if you choose. Let's look at each of these programs.

ENTRY

This is the main program for the ALF Music Card—the one you use to enter your music. You can use it to compose your own selections, or to enter selections from sheet music.

The screen is shown in Figure 1. When you first see it, there are no notes on the staffs, only the key signature (key of C) and 4/4 time and those eight x's. The notes you see in the figure are from the first bars of "My Country, 'Tis of Thee" which I entered from a hymn book. (For some reason I chose the same selection, although different version, as used in the ALF manual.)

The top of the screen display is the normal music notation system. (It will help to know how to read music, but if you are just copying off sheet music you can probably do OK.) Below the staffs is a line containing pictures of whole, half, quarter, down to 64th notes, plus "rest," a dot (for dotted-notes), "3" for triplets, the sharp, flat and natural symbols, two arrows, "ins" (for insert), "del" (for delete), "tie" (for guess what?), and a speaker symbol. A cursor lies under this line of symbols (in Figure 1 it is under the quarter note) and its position is manipulated by game paddle 0. Two text lines are below this on the screen. These keep track of what measure you are in, which part (0 to 8), how many bytes of memory are free (5904 in this case), and a bottom line of information about what is happening at that particular moment (note) in the music. There is another cursor (not shown) at the very bottom of the screen for input from the keyboard.

Look carefully at the figure again and you'll see, between the treble and base clefs, just to the left of the 4, what is call a "flying saucer" by ALF. The location of this saucer is governed by game paddle 1. Your entry is done by the two game paddles and the keyboard—you don't really need three hands, as there is little typing to be done on the keyboard and most of the music entry is done by the paddles, one in each hand.

To enter a new selection, you type NEW and then respond (at the bottom of the screen, using the keyboard) to a few questions: number of parts (this can be changed later), initial speed (you can change the speed of playback later), the title lines (for the 4 lines of text to be displayed at the bottom of the screen when the music is being played). YOU may then be ready to enter the music, but ALF isn't, yet! You have to describe a few other details. You begin by typing in the key—e.g. for this selection with one flat, you type KEY:1F, pretty

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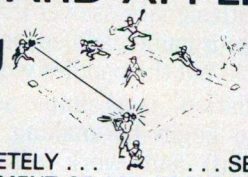

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simple! You don't have to know what key has one flat. The program automatically puts the flat symbol (the "b") on the staff. Next you specify timing—e.g. for this selection TIME:3/4 gives us 3/4 time where there are 3 beats per measure and each quarter note gets one beat. The 3/4 is written on the staff by the software.

Now we come to the 8 x's. These define the type of sound we'll get from the synthesizer. We'll discuss them more when we get to the ENVELOPE program, but they include: QUARTER, GAP, TRANSPOSE, ATTACK, DECAY, VOLUME, SUSTAIN, and RELEASE. Default values are included so we don't have to worry about these settings initially.

By now the saucer should be to the right of the last x and you're finally ready to enter the music. In your left hand you hold paddle 0 and in your right, paddle 1. With paddle 0 you move the cursor back and forth under the notes and other selections near the bottom of the screen. When you get to the note type you want, you press the paddle button. To enter the first note of the selection in Figure 1, we'd move the cursor under the quarter note. Moving paddle 1 moves the saucer up and down (vertically) on the staffs, with a click sound as it moves from one note to the next. After a little practice, you find yourself not even looking at the screen for each note, just listening to the clicks as you watch your sheet music and determine how many notes (or what "interval" for you music buffs) you are moving. When the saucer is positioned where you want it, press the button and the proper note value is drawn on the screen in the saucer position. The saucer also moves one position to the right so you are ready for the next note. In our example, it is the same value and same note, so we would just press the button. Then with the paddle, we'd move the saucer up one note, press the button again. Not only would the

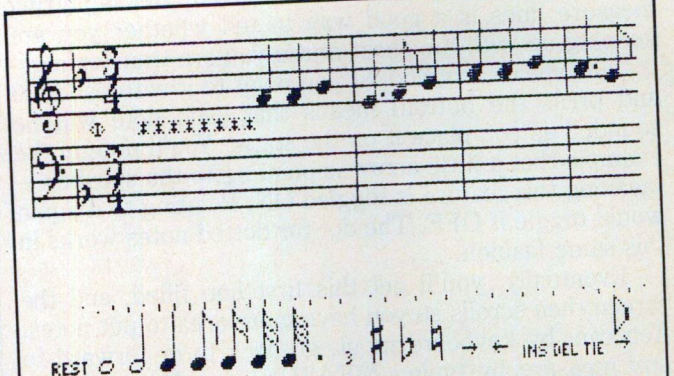


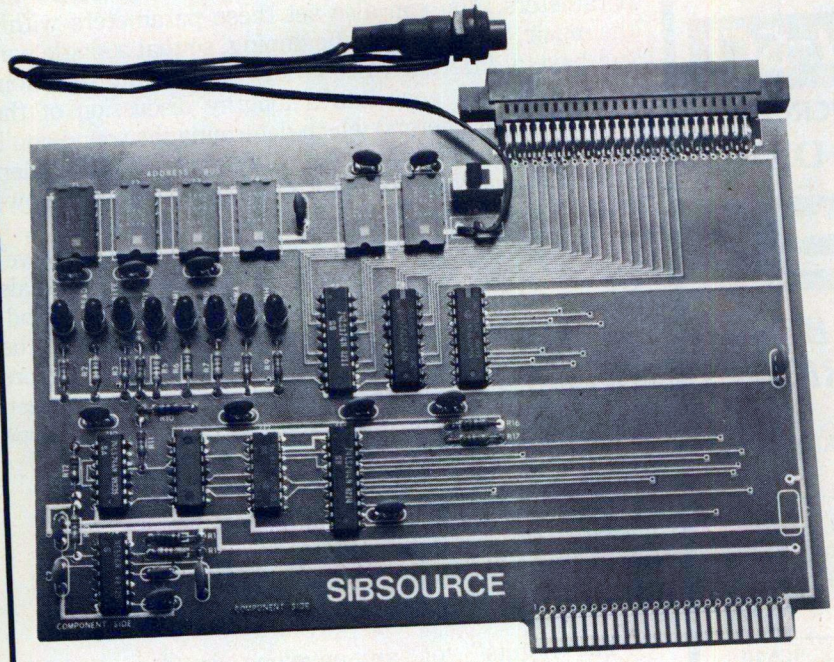
Figure 1

note be drawn, but the measure lines would also be placed—the program is smart enough to realize we now have the required 3 quarter notes for one measure.

As you enter each note, the display at the bottom of the screen indicates the note in text form. For example, for the first note in Figure 1, it would show: F3Q, meaning the note F in the 3rd octave—a quarter note.

If you make a mistake, you can re-enter the correct note in any position and it will replace the existing one.

APPLE BUS MONITOR & EXTENDER



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If you need to insert or delete a note or notes, you point with paddle 0 to the "ins" or "del" message below the staffs first, then press the button. Automatic adjustment of measures is made as you put new notes in and out. In fact, keeping an eye on where the computer is putting measure lines is a good way to tell whether you are keeping up with the sheet music you are transferring.

The speaker symbol (if you point to it with paddle 0 and press the button) means that each note will be sounded as you place it on the staffs. You'll note in the example that a little arrow is pointing to the speaker—meaning this feature is toggled ON. Pointing to it again would toggle it OFF. The dot for dotted notes works in this same fashion.

Eventually, you'll get this first line filled, and the screen then scrolls so you have more area to put notes. You can, by keyboard input, go back to or forward to any measure by typing MEASURE:n, where n is the measure number. Another useful hint is to number the measures on your sheet music first to help you keep track of your place. This is particularly important since you can only enter one voice at a time—you can't see what the other voices are doing, so measure numbers are important.

When you are finished with this voice, you can type PLAY:P and the whole part is played from beginning to end. The optional suffix P in this command means that you can adjust the speed of playback with the paddle. As you do, the pitch stays as it should (doesn't sound like Alvin and the Chipmonks!). To enter the next part, you type PART:n for the next part number and enter the notes.

It is surprising how you get into a flow of entering music with this system. Eyes on the sheet music, paddle in each hand, twisting the knobs, punching the buttons, and hearing each note. There were 14 measures and 4 parts for the selection shown, and it took me about 25 minutes to enter it. When it sounds the way you want it to, you can then save the file to disk.

The ENTRY2 program is for use with the Apple *IIe*. (I didn't try it.) This version of the music entry program allows you to use the *IIe* or Apple *III* without paddles. In place of the paddles, the 4 arrow keys and the open Apple and closed Apple keys are used (space bar on Apple *III*). With this program you do not have the PLAY:P option since there are no paddles to use to adjust the speed. You use the SPEED command instead.

Several other commands add flexibility to the system. EDIT is used to add parts and change the suggested speed or the title lines. The SPEED command changes the duration of all notes, rests and QUARTER functions. The STEREO command changes the selection of which parts go to which channel (L, R or Middle).

You can also use subroutines in your music. A subroutine might be a section which is repeated, so you do a CALL to the subroutine rather than enter it multiple times. You can also TRANSPOSE the composition with a simple command which allows you to adjust the pitch in quarter steps. Twenty–four quarter steps equal 1 octave.

ENVELOPE

Remember those x's at the start of the music. These are for parameters that you use to define the way a voice sounds. There are almost an infinite variety of possible sounds, depending on your selection of values for the parameters. You can also set these parameters within the music, not just at the beginning, so that a single part can have a different voice at any point in the selection.

The manual goes into a lengthy discussion of the envelopes (parameters) which determine the sound you'll get from the synthesizer. I've never really tried to understand it thoroughly, but the ENVELOPE program allows you to experiment and develop your favorite settings.

This program displays a graph of the sound envelope, as shown on the top of Figure 2. The vertical scale is loudness, and the horizontal scale is the time period. The idea behind the envelopes is to specify how fast the sound increases, is sustained, decays, and pauses before the next note takes over. The bottom of the screen displays the settings which caused the sound envelope plotted. Let's look at the easy parameters first:

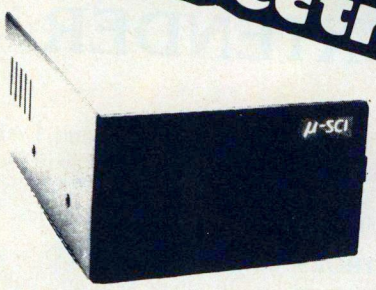
PDL:	paddle setting for speed of playback
TRANS:	transposition in quarter steps
VOLUME:	volume setting
FUZZ:	used to select fuzz (white noise) for simulation of percussion effects

The "guts" of an envelope is described by ATTACK, DECAY, SUSTAIN, RELEASE, and GAP settings. They function as follows:

ATTACK determines how quickly the volume increases as the note is first played.

DECAY determines the maximum rate that the

Laing Electronics



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loudness can decreases until it reaches the SUSTAIN loudness.

RELEASE determines the rate of loudness decrease after the SUSTAIN level.

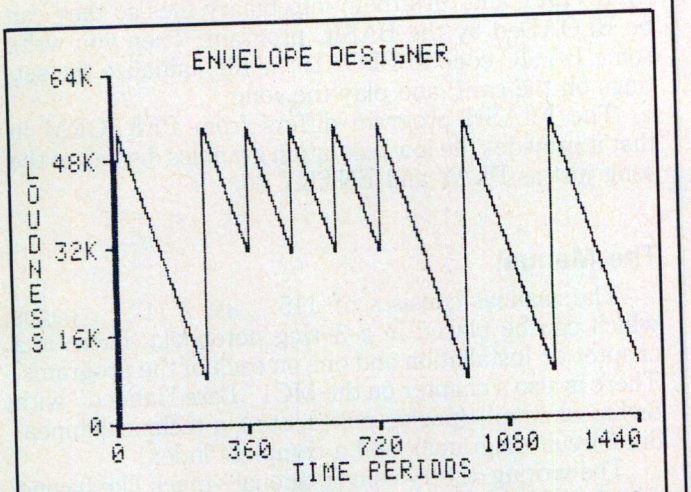

Figure 2

GAP determines how soon (before the next note) the RELEASE occurs.

Have you got that? (I'm not sure I do either!) Fortunately, the best way to see what is really happening is to use this program. Toggling to the accompanying text

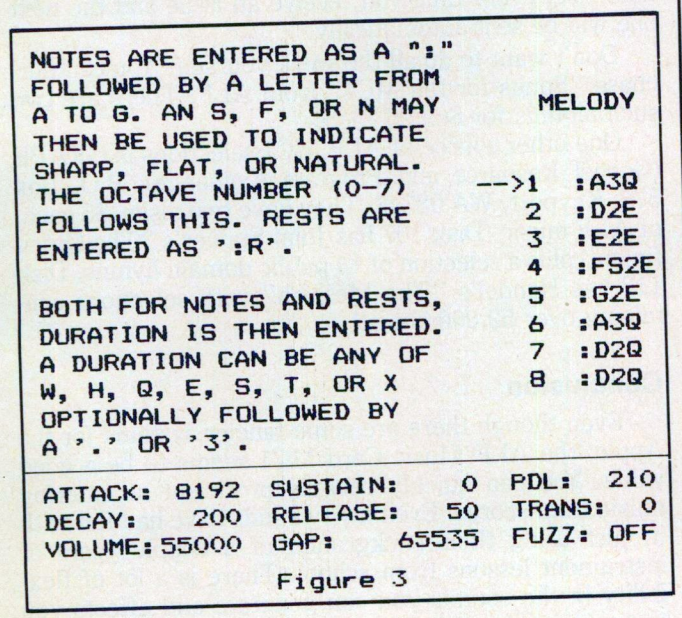

Figure 3

screen (Figure 3) you can enter an 8 note melody. The notation for each note is the same as in the ENTRY program. Shown here is the default melody.

By typing in different values of each parameter, e.g. ATTACK:100, and pressing the paddle button, the 8 notes are played with this envelope. It is best to try varying one parameter at a time to check each individual effect. Another way to "play" with envelopes is to check those in the sample songs on the ALF disk (using the MLIST program below).

PROCESS

This is the advanced editing program which permits you to move large sections of music. With it you can put some sections into subroutines, or append one song to another. It actually works with two songs in memory. I'm sure it is very useful, but I haven't had any need to use it for the simple music I've been entering.

MLIST

This program produces (on the screen or printer) the details of a song that has been entered. By specifying the appropriate parameters, you can see all of a song (envelope settings, notes, rests, etc.) or just certain features. For example, you can have it display just the envelope settings and not the notes.

Figure 4 is the MLIST output for the "My Country, 'Tis of Thee" selection that I entered—Part 0 only. The numbers to the left of each line are the measure numbers. In the first measure you see the key, time, envelope parameters, etc., along with the three notes of the first measure: F3Q, F3Q, and G3Q.

For comparison, I ran an MLIST of the sample song "Symphony #94" on the ALF disk. It contains 133 measures, 6 parts, and has a playing time of about 3½ minutes and takes 701 bytes of memory. The MLIST was over 8 pages long. (My sample entry of 4 parts, 14 measures, had a playing time of 28 seconds, used 198 bytes, and took a little over one page to list.)

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PLAY

Running PLAY brings up a dot (.) prompt. You can then load, or play any selection you've created. The advantage over the ENTRY program is that it takes less memory, so it is faster loading and can use songs too large to load with ENTRY. You can also use most DOS commands to create custom EXEC files. I found this program quick and easy to use if I wanted to play a single selection or two from a disk—CATALOG the disk to see what is there, then LOAD and PLAY.

```
1 KEY:1F; TIME:3/4; QUARTER:240
  GAP:20; TRANSPOSE:0; ATTACK:8192
  DECAY:25; VOLUME:55000; SUSTAIN:0
  RELEASE:1500; :F3Q; :F3Q; :G3Q
2 :E3Q.; :F3E; :G3Q
3 :A4Q; :A4Q; :B4Q
4 :A4Q.; :G3E; :F3Q
5 :G3Q; :F3Q; :E3Q
6 :F3H.
7 :C4Q; :C4Q; :C4Q
8 :C4Q.; :B4E; :A4Q
9 :B4Q; :B4Q; :B4Q
10 :B4Q.; :A4E; :G3Q
11 :A4Q; :B4E; :A4E; :G3E; :F3E
12 :A4Q.; :B4E; :C4Q
13 :D4E; :C4S; :B4S; :A4Q; :G3Q
14 :F3H.
```

Figure 4

DISCO & HUSTLE

When you want to play a number of selections, and have the computer take over as a disk jockey to handle loading and playing, you can use either of two programs, DISCO or HUSTLE. They both use ALBUM files—text files containing the necessary commands to execute the PLAY program along with the names of the song files to be played.

For example, by loading DISCO and running it from line 1000, you are prompted to type in song names that you would like in the ALBUM. If you've forgotten the names, you can CATALOG the disk. When you've entered all you want, you type STOP and the program tells you how many songs you've selected. Songs for an album can be on either disk drive—you simply enter the normal drive designation (D1 or D2) at the end of each song name. There can be only one ALBUM file on a disk, but you can delete it or add songs to an existing album.

Playback of an album can be done in two ways: (1) predetermined order—by doing an EXEC ALBUM (the text file takes over running PLAY and then each song in the order you entered them in creating the album), or (2) random order—by using RUN DISCO.

HUSTLE is similar to DISCO except that it will automatically read the song names from a disk and ask if you want to include each on the album. If you say yes, the title stays on the screen so you have a list of your selections.

PERFORM and FLASH

The final two programs are in binary and can be used to have Applesoft BASIC programs play songs created by the ALF music system. This requires some programming work first, but the programs are listed in the manual. The first step is to take the song files as created by ENTRY and turn them into binary files so they can be BLOADed by the BASIC program. Then you write some BASIC code to BLOAD the file, initialize the settings on the card, and play the song.

The FLASH program differs from PERFORM in that it provides the low resolution graphics display of the song just as PLAY and ENTRY do.

The Manual

The manual consists of 115 8½ x 11" pages which can be placed in a 3-ring notebook. There is a chapter on installation and one on each of the programs. There is also a chapter on the MC1 "Bare Handed" with technical details (peeks, pokes, etc.), a technical appendix (circuit diagrams), and a complete index.

The writing is very conversational—much like having a trusted friend sitting with you showing you what to do each step of the way. There are pictures of screen displays and sections of musical scores. The best part is the light humor used throughout — a very well done manual.

Continuing Support

ALF publishes, on an irregular schedule, a newsletter. Although it covers all of ALF's products, there are usually several short articles on the Music Card in these 4-page publications. You can subscribe to the newsletter, or send back a self-addressed stamped envelope (business size) every time you receive an issue and the next one will be sent automatically.

Don't want to do all the work yourself? You can purchase "Songs for the MC1" from ALF. There are two such albums for $69.95 each.

One other source of ALF MC1 selections is GRAPE (Gospel Resource and Program Exchange), P.O. Box 576, Keyport, WA 98345. They have two disks, $5 each, of ALF music. Disk 107 has John Stainer's "The Crucifixion" plus a selection of 84 public domain hymns. Disk 112 has Handel's "The Messiah" with selections containing over 52,000 notes!!

Conclusion

Even though there are some fancier systems for the Apple, the ALF Music Card MC1 seems to be a good value. You can quickly become proficient at entering music from scores. Even my two kids have had fun with it, just using their background of a couple years of instrument lessons from school. There is a lot of flexibility in the sounds you can generate and effects you can get with the "fuzz" parameter, subroutines, 9 voices and stereo channel selection. The manual is a quality offering and the software is open for you to learn from, if you desire. There are times when it would be nice to be able to see all voices on the screen music notation—but maybe if you tried that it would be too cluttered to be useful. The ability to get a printout of the music would also be nice. Overall, the ALF Music Card MC1 is a worthwhile product.

Mountain Music System

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Greg Dunn

IF YOU are an Apple II owner with fair computer skills and a burning desire to express yourself musically, but feel the composer/arranger in you limited by the instrumental performer, then you'll probably love the Mountain Computer Music System as much as I do. It's like having a dedicated ensemble waiting in your living room—with keyboards, woodwinds, strings, brass, percussion, and several closets full of miscellaneous other instruments, some from other planets—to play your latest composition. This is a luxury an Arab sheik with a musical bent might afford, but I never really expected to have it myself.

Hardware

The Music System hardware consists of two boards plugged into any adjacent slots (except slot #0) in the back of your Apple. One of the boards includes 16 electronic oscillators that produce the system's sound, which is output through two audio wires terminating in standard RCA male output jacks. A stereo extension wire is provided for easy connection to a nearby standard home stereo amplifier. Also attached to the oscillator card is a light pen, one of three alternative user input modalities. This pen doesn't work with the Apple Monitor *III* screen (which I have) because the anti-glare screen cover diffuses the outgoing light. It also won't work with a color TV hooked up through an RF modulator. I had some initial difficulties with a weak output channel, but the problem was eventually corrected, by accident, upon removal and re-installation of the boards.

The Music Player

After booting the software, the main menu gives you a choice of the Music Player, the Music Editor, or the Music Merger. You should first try the Music Player to sample a couple of melodies provided on the Song disk. The instrument sounds can be varied for the same song by using the Instrument Definitions disk.

Most of the sample songs are two-part compositions which fall short of the system's full capabilities. With careful oscillator management (more on this below), you can get five or six solid parts in a piece. I recommend that you consider the demo records available from Alpha Syntauri and Passport Designs, two companies which make keyboards for the Music System.

There are two kinds of music files. "COMP" files are produced by the Music Editor, and must be compiled before becoming playable. Compilation can take a while for a large, complex piece. For example, something with five parts that runs two or three minutes can take five minutes to compile. Once a song is compiled, instrument definitions must be loaded. This requires 15 to 60 seconds of disk reading, depending on how many different instruments you're using. As soon as the definitions are loaded, the piece begins. When it finishes, you save the compiled version on a "PLAY" file. A nice feature of the software design is that instrument definitions can be changed on a PLAY file by simply loading the new definitions over the old. Another five-minute compilation is unnecessary.

The Music Editor

The basic design and features of the Music Editor are well-conceived and well-implemented. Three entry modes are available: keyboard, game paddles, and light pen. In general, I recommend paddle entry. This involves using one of the paddles to select an element from a hi-res menu of music symbols (Figure 1) and, if the element chosen is a note, using the other paddle to place it appropriately on the staff (notice the arrow in the figure). The paddle buttons accomplish the actual entry. It's an excellent, intuitively efficient mode of entry, and I congratulate the people at Mountain for it.

Options available to the composer include: choice of any standard key (0 to 7 sharps or flats), nearly any time signature (standard or otherwise), notes and rests (from 1/32 to whole, dotted if desired), tempo control (changeable as often as desired during the piece, but limited to uniform changes across all parts), dynamic control (also changeable as often as desired and not limited to uniform adjustment across all parts), ties, and such fine-tuning elements as staccato, staccatissimo, and tenuto. (Don't worry, I didn't know what "tenuto" meant either until I looked it up!) Triplets are not directly supported, but these can be reasonably well approximated using elaborate combinations of tied short notes. For example, one regular and two dotted 32nd notes tied together have approximately the same duration as a quarter note in a triplet. Also not supported are pitch bends. This means, for example, that you can't do a very convincing electric lead guitar.

There are a few features missing that I would have liked to see. One is a display of the current filename while working in the Editor, which is standard practice in word processing editors. For the Music System, the edit file name is not accessible during the editing ses-

sion, which can be a problem when you're juggling several different versions of a given piece. It's easy to forget whether you've got version D or version E of part two of your composition in the Editor, for example.

Another shortcoming lies in the difficulty of deleting portions of a composition. You can either delete an entire part and start over, or you must delete note-by-note, measure bar-by-measure bar, rest-by-rest. There's no "Delete Measure" feature, much less a "Kill Right" or "Kill Left" (i.e., delete to end of part, moving either to the right or to the left). The omission of these wouldn't be a major problem except that, due to the way the Music Merger works in stringing composition files together, it's often critically important that a given instrument part not be completely deleted, even if you're going to change every note in it. If you use the "Delete Part" feature followed by an "Add Part"—for example, so you can try an alternative harmony line—the part changes position with respect to other parts in the file. This can cause problems when working with the Music Merger, as discussed below.

The Music Merger

Since the Music Player can accommodate larger files than the Music Editor, the Music Merger can be used to link separate "Comp" files. By using the Music Merger you can get a continuous play piece many times longer than will fit in the Editor. For a moderately complex piece, however, the largest sequence that will successfully compile may be no more than two to three minutes of music. To get a longer song together, you may have to play the verses separately into a tape recorder and splice them.

A somewhat annoying aspect of the Merger lies in the way it strings individual instrumental parts together in files

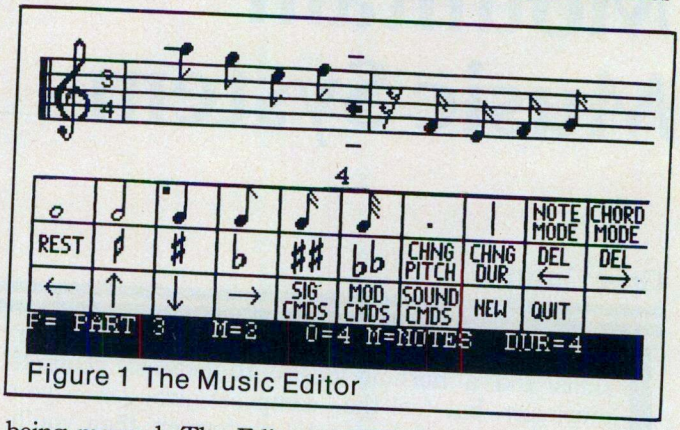

Figure 1 The Music Editor

being merged. The Editor and Merger both ignore your names for the parts, and only consider their ordinal, internal numbers. Deletion of a part (so that, for example, you can substitute a different instrument taking a lead line) results in the re-assignment of the ordinal, internal part numbers. This may cause your harpsichord bass line suddenly to metamorphose into a woodwind line in the middle of your composition! At the same time, your woodwinds might turn to brass, and your brass into a clavichord!

Even worse, one part may finish prematurely or another part may drag on when all the rest have stopped, because a section from some other part got unintentionally appended to it. Suffice to say, avoiding these problems either takes intricate planning or tedious note-by-note deletion (as described under the Editor discussion) to preserve the order of your parts. It all could be avoided if the Merger would recognize and match parts by the name you give them.

Instrument Definer

The Music System's Instrument Definer is included on a second master disk separate from the one containing the Editor and Merger. (For convenience, both system diskettes contain an identical copy of the Player and both are unprotected.) The Instrument Definer subsystem allows you to define and modify instruments in order to get new sounds from existing melodies. This task can be approached from either of two extremes. On the one hand, you could just jump in and create. Most probably, you would start with an existing instrument, and then mess around with the various elements that define a unique instrument sound (discussed below) until you get something you like. The Instrument Definer Tutorial gives you a good start on this approach.

On the other hand—because an instrument definition is a pretty complex beast involving funny-looking waveforms, harmonic series of frequencies, attack, delay, sustain, and release time specs, and possibly frequency and amplitude histories—you could buy a complete set of all back issues to The Computer Music Journal, enroll simultaneously at both the Eastman School of Music and the Princeton Physics Program, and study for a few years before actually creating a new instrument.

I would recommend an approach somewhere in

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between. A very good introductory discussion of the manner in which the various instrument definition parameters affect sound is included in the Music System manual, and several nice instruments are included on the system disks. By reading the first, studying the

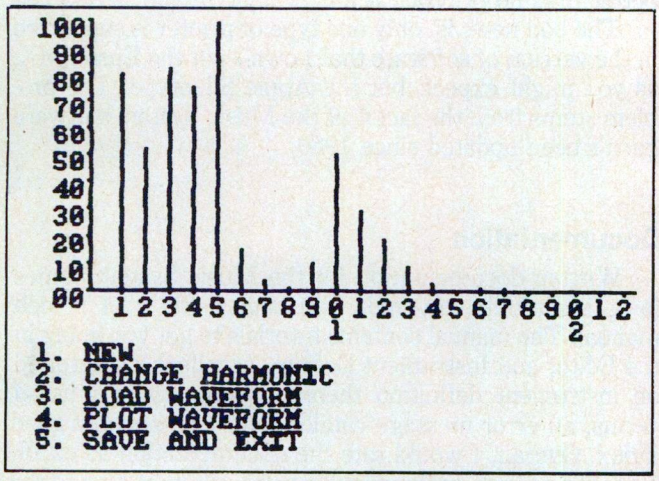

Figure 2

The Instrument Definer

second, and then plunging in to experiment, I think you can probably get the understanding you need. This is the approach I am personally taking, although I admit I've been more interested in using the system as a tool for standard musical composition on standard instruments than in attempting instrument definition. But I've seen enough to feel that the Music System is an excellent, and relatively inexpensive, beginning-to-intermediate tool for composition/arranging in either traditional or wild-eyed electronic modes.

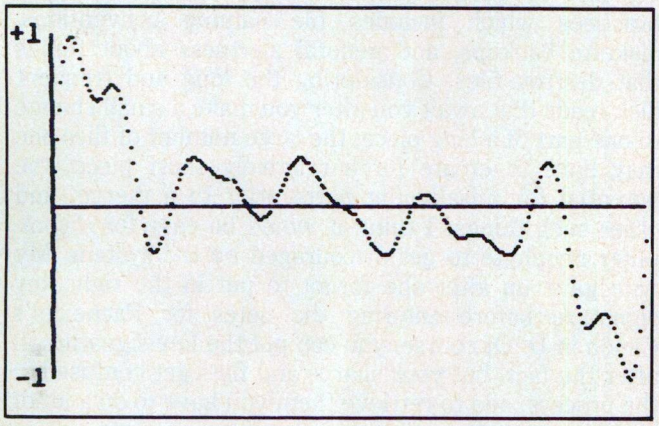

Figure 3

Display of a newly created waveform

General Musical Abilities and Limitations of the System

The Music System creates the sound of some instruments better than others. It does electronic organs quite well, since both produce their sound in much the same way. It also does a good job with wind instruments, as well as bells of various kinds. Bowed string instruments such as violins and cellos are marginal or worse; and plucked or struck string instruments such as acoustic

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guitar or piano are abysmal. However, you can get a reasonable facsimile of an electronic piano; and I've got a harpsichord instrument definition from Mountain which renders a surprising likeness.

Tuned percussion instruments, such as a kettle drum, wood drum, or gong, come off very well. I'm not sure about untuned drums, like a snare. These are clearly synthesizable, as testified by the plethora of drum synthesis devices available commercially, but I haven't heard the Music System do anything like one.

One important limitation of the Instrument Definer is that, unlike "real" instruments, your synthetic ones cannot change character (with respect to waveform, attack rate, etc.) as they move through different pitch ranges. One way around this is to define different instruments for different ranges. Included on the system disk, for example are the instruments "Pianolow", "Pianomid," and "Pianohigh." However, the Music Player does not support a change of instrument definition in the middle of a part, so to use the appropriate definition for the appropriate range, you must define different parts in the Editor for each permutation of the instrument, and put in each part only the notes appropriate to each, filling out around them with rests. This seems to be unnecessarily tedious.

Printer Support

The good news here is that the Mountain Music System supports the output to a printer from the Music Editor. This is immensely helpful for debugging an incorrectly entered piece, or when one begins making the inevitable changes from the original written score. The copy does not come out in neat, standard, multi-part, 8½ x 11 inch sheet music, but rather one part at a time in oversized 90-degree-rotated form. Still, that's much better than no printout at all.

The bad news is, only one type of printer is supported in the version of software that I own—not the Epson MX, as you might expect, but the Apple Silentype! The problem stems from the fact that the Music System software hasn't been updated since 1980.

Documentation

Written documentation for the Music System comes in a beautifully covered, 130-page, 8½ x 11 inch manual. The manual contains tutorials to get you going in the Editor and Instrument Definer, excellent background on instrument definition theory, a glossary of musical terms, an error message catalog, and a reasonably good index. Overall, I would rate the documentation as excellent. It's an extremely valuable reference that gets to the heart of things in few words. The most serious deficiency I noticed was a scantiness of explanation regarding the Music Merger's manner of splicing files.

Conclusion

Mountain has given computer users a tool that allows us to put our computer skills to use in the service of creating music. However, would someone without computer experience have difficulty using this system successfully? I would have to say that it may be an uphill struggle for many a dilettante—maybe many a music student. Successful use of the system requires a fair measure of good "computer hygiene," that body of practices which includes file naming conventions, diskette backups, and general alertness about things that destroy files. Considering the long and frequent disk reads that await you after you make a small change to one part of a long piece, the large number of files one may have to create for a relatively short piece, the potential for misaligning parts prior to a merge, and other such things, I think it would be easy for a computer neophyte to get discouraged by the system. My wife gave up after she forgot to put in the right key signature before entering the notes for Pachelbel's Canon in D. Of course, you can put the key signature in after the fact, but your sharps and flats get confused in the process, and to retrieve them you have to do a lot of single-note editing. She went back to her piano.

On the other hand, learning to use the Music System (assuming you already know a little bit about musical notation) is a task more on the order of learning a moderately difficult word processor than of learning programming. To be fair to Mountain, let's remember that friendly interfaces require lots of computer resources, notably lots of rapidly accessible memory, and high processor speed. Considering that the Mountain people were working within 48K, I think they did an excellent job. If I seem at all critical of the Music System, it's because I love her so much. For my money, it's the all-time great add-on to the Apple!

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Soundchaser System

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COMPANY:	Passport Designs, Inc. 116 N. Cabrillo Hwy. Half Moon Bay, CA 94019
INCLUDES:	4-octave keyboard Interface card Software Disks Mountain Music System Manual

William K. Dolen

WHEN I got my Apple a few years ago, I bought the Mountain Computer Music System with plans to program its sixteen oscillators to play fiendishly difficult pieces in exotic musical temperaments, and to experiment with theory, acoustics, and music composition. However, I soon found the software to be too limited for my needs. Since adding the Passport Designs Soundchaser System to the Mountain Computer boards, I have used the versatile Soundchaser software (or my modifications of it) both for entertainment and in my musical experiments.

The Soundchaser is a powerful, sophisticated musical instrument, not just another high-tech toy. It is not a piano, an organ, a rock band, or an orchestra, although it can imitate many of these sounds. It is limited only by the musical sophistication of its user. As with any other musical instrument, it can be enjoyed on different levels, from beginner to virtuoso. A musical novice will not at first get professional results, but the performance software—particularly a new keyboard editor—will allow a keyboard klutz (like me) with some knowledge of music to get spectacular sounds after a little work. The best way to learn about Soundchaser is from actual use. Bring some music along with you when you go to the dealer.

HARDWARE

Computer System Requirements

Soundchaser works with the Apple II (Applesoft required), the][+ , or the *IIe*, a monitor or TV, and at least 48K of memory. A 64K memory is advisable for users of the "Turbo Traks" software, and is necessary for Polywriter. I have also seen Soundchaser successfully used with a Franklin Ace 1000, and suspect that it *might* run on some of the other fake Apples. Only one disk drive is needed, as a second drive is not supported. A joystick or game paddles is essential for creating and editing waveforms. A printer is also useful for editing music files, and (with a Grappler or Prometheus interface) is needed for the music transcription programs. Incidentally, the software crashes (at least for me) when the shift wires for a popular word processing program are installed.

The Music System (SC Series)

The Mountain Music System, a 16 oscillator digital synthesizer, is included in the price of most Soundchaser systems. Certain late model Apple][+'s require a motherboard modification to be able to run the Music System. The two boards go in slots 4 and 5 for Soundchaser. Stereo output cables connect to the "AUX" input jacks of a home stereo system, or (with an adapter) to headphones. The cables may also be connected to mixing boards or other amplifiers. The Mountain Computer hardware can generate sounds from about 16 Hertz (with an appreciable rolloff below 32 Hertz, the low C of a *huge* pipe organ) to about 13,000 Hz.

Soundchaser Keyboard and Interfaces (SC Series)

The Soundchaser SC hardware consists of a four octave keyboard, a ribbon cable, and interface card placed in slot 7. Software provides an interface with the Mountain Music System. It is a good idea to use a zero-force insertion device with the keyboard interface so that the keyboard may be easily disconnected for moving. The keyboard is built to standard specifications of the American Guild of Organists, and is enclosed in a hardwood cabinet. The keys are 49 switches, use of which is software defined. Under normal conditions, the Soundchaser can cover a range of nine octaves, and the keys can be redefined if you want to fool around with microtones or temperament in multiple divisions. The keyboard has a good feel and response. There is no velocity sensing feature or sustain pedal, so the technique of performance is more like that of an organ or harpsichord than a piano.

An optional feature for "Turbo Traks" users is the ability to interface, with synchronization, to one of several commercially available drum machines. Use of these devices will enhance rock music pieces, producing a one-computer band.

The MX-5 Hardware

A new addition to the Soundchaser line is the MX-5 five octave keyboard and its one-board synthesizer/keyboard/drum sync interface card. The usefulness of a five octave keyboard is obvious, as is the advantage of a single interface card versus the three cards needed for the standard SC hardware. The MX-5 system requires new versions of the Soundchaser software series; and Turbo Traks, bundled with the MX-500 system and Polywriter, are the only ones presently available.

SOFTWARE

All Soundchaser software is sold on disk in unprotected format, and comes with reasonably good docu-

mentation. The unprotected disks allow users to modify the performance software, perhaps to enable it to compose music, perform in rare or novel temperaments, or enter waveforms with a graphics tablet. Present releases use Diversi-DOS, resulting in a considerable saving of time when loading files.

A lot of software is available, but not everyone needs (or can afford) a complete set of Soundchaser software. For example, I am primarily interested in classical music but don't teach, so I don't need the drum sync option, or education software. Software can be bought individually or bundled with various system options.

Some users are writing significant, but perhaps not marketable, programs for the Soundchaser. Each of us has had to discover the inner workings of the system software, since the company is not particularly responsive to inquiries about proprietary information. If a users' group ever gets off the ground, one of its first duties should be to publish a "Beneath the Passport Soundchaser" manual for programmers who want to go beyond usual means of waveform creation and musical performance. A users' group could also exchange favorite track files, presets, and waveforms.

4-Track Performance

A standard feature of the SC system is 4-track capability. In my opinion, it has not been made obsolete by the introduction of the 16-track "Turbo Traks," and it is a lot easier to use. It consists of a real time section, a recording/playback section, a disk section, and a waveform editor section. Programming is in Applesoft and in machine code, both of which may be listed for examination and modification.

Once everything is plugged in and the disk is booted, the system is ready for immediate use. The keyboard is always live in the performance section, and the user may, at any time, select one of ten predefined sounds, or "presets." Other presets may be loaded individually or collectively (in groups of ten, called "masters") from disk. Each preset uses two of the Music System's sixteen oscillators, each with its own distinct waveform. A third waveform is used for vibrato and other special effects. As many as eight notes can be played simultaneously.

When a preset is selected, Soundchaser displays the attack-decay-sustain-release characteristics (ADSR envelope) for each sound-producing waveform. These parameters may be altered during performance. An overall volume control can be adjusted, as can the width of vibrato and keyboard range, all in real time.

A performance may be recorded in the Apple memory on one of four "tracks," and saved on disk. The ability to record on multiple tracks is Soundchaser's forte. Those of us who aren't keyboard virtuosi can put a Bach fugue into the Apple, *voice-by-voice*, while listening to the others which have already been entered. Keeping things in synchronization takes a metronome, experience, and a little luck. Each track can hold about 1000 notes, or all four tracks can be combined in "LINK" mode for a capacity of more than 4000 notes with an automatic repeat feature (for those of us who like to write grounds, chaconnes, and passacaglias). During playback, the preset assigned to a track may be changed, permitting "orchestration." The other parameters previously described are also changeable, and the keyboard remains "live." Try that with any "sound-on-sound" tape recorder or player piano!

Waveform editing requires exit from the performance section. In theory, any musical sound can be expressed as the sum of several sine waves of various frequencies and intensities. An instrument's timbre involves more than steady state waveforms, though, and even these vary in nature from note to note. Modification of ASDR envelopes is necessary to make a waveform sound like any particular instrument, and this is more of an art than a science. Fortunately, the 4-Track disk comes with 5 masters, for a total of 50 presets. Some of these are really good, others are mediocre or worse. A few create incredibly bizarre sound effects, and all can be modified or replaced by the user.

Other important features include the ability to redefine (alas, not in real time) the tuning and temperament. A=440 and equal temperament are standard, but we classicists and theorists can have A=415 and Pythagorean tuning or mean temperament in seconds. With a knowledge of pitch relationships, one can alter the tuning so that a transposition occurs.

There are certain limitations. The 4-Track software does not look for or utilize the language card. The recording section is so efficient that it captures every mistake of technique or phrasing, necessitating rerecording of the entire track to obtain a perfect performance. The 4-Track Editor, available as an option, can be used to "punch out" mistakes if rerecording would be more work. Track files use lots of disk space (always 42 sectors regardless of the length of the piece), and loading under standard DOS takes a while. Loading and playing cannot be done automatically. If one wants to play an "album" of Christmas carols at a party, a separate utility (Traksplayer) must be used.

4-Track Editor

With this recent addition, it is possible for keyboard novices to enter notes for playback at unimaginable tempi, as well as edit mistakes made in real time performance. As the disk boots, an excerpt from the C-minor prelude of Bach's Well Tempered Clavier (Book I) is played. Fortunately, it can be stopped with a quick CTRL-C if desired.

The 4-track Editor is a hacker's utility. Editing a real time track is hard work which takes a good understanding of hexadecimal arithmetic (addition and subtraction) to produce a result that will keep all four tracks in sync. Using a hex calculator may be considered cheating by some, but it avoids many mistakes. The hardest part of editing is finding the mistake, since there is no "search" feature. To help in locating trouble areas, a track can be dumped to the printer. Once found, the offending error can easily be excised, but the deleted section must be replaced by notes or rests of the same total duration . . . or else.

Duration is entered from the Apple keyboard by assigning appropriate hexadecimal note durations as presets for the number keys at the beginning of a session. It is useful to place a card with pictures of quarter notes, sixteenth notes, etc., behind the keys to serve as reminders. The notes themselves are entered at a comfort-

able pace from the Soundchaser keyboard, and rests are entered with the space bar. Once everything is set up, note entry goes quite fast; and an automatic repeat feature saves a lot of time. When I first got the editor, I entered the entire Pachelbel "Canon" in about 45 minutes, and it would have been even faster if I had bothered to read the manual first.

Other features include the ability to smooth rhythmic irregularities, and to choose between "legato" and a "staccato." This allows articulation and phrasing, but uses more memory. One unnerving problem is that a staccato note is displayed as one note during entry, but is stored and later redisplayed as a note followed by a rest. If a mistake is made during note entry, two deletions must be made, regardless of what appears on the screen. All sorts of trills and ornaments are possible if the user can conceive of them in mathematical terms. I use this program more than you might guess. It does things which can't be done any other way, although it is usually easier to rerecord a track than to fix mistakes. I wish it were more "user friendly." The disk also has some new master files. Some of the "string" presets are very nice, and are demonstrated with an excerpt from Brahms' First Symphony.

Turbo Traks

Do you want to use all sixteen oscillators independently, with stereo effects? Turbo Traks is a magnificent transformation of the 4–Track performance software, taking full advantage of the Music System's capabilities. Naturally, it isn't as easy to use as its predecessor, and (like any instrument) takes some getting used to. The instruction manual is enjoyable and well written (although with an intimacy which at times is condescending), and warrants careful study. As with the other Soundchaser manuals, it doesn't go very far into the theory of ADSR envelopes and Fourier synthesis. It turns out that the disk access and Wavemaker sections are more or less the same as their 4–Track counterparts, but the way waveforms are assigned to oscillators and the manner in which oscillators are assigned to presets has been changed. Oscillators now may have linear or logarithmic ADSR characteristics, and a single preset may use from one to sixteen, rather than two, oscillators. The number of oscillators in use at any one time may not exceed sixteen, or eight per stereo channel, a hardware limitation. Thus, the use of multiple oscillators per preset limits the number of possible polyphonic tracks. With a bit of planning, sixteen part polyphony is possible. The keyboard may be split so that one preset is assigned to the left half and another to the right.

An intriguing feature is the ability to delay the attack of an oscillator. Presumably, it would be possible to design a preset so that one oscillator is used for transients and another oscillator can produce the steady state waveform moments later.

The sequencer menu presents a list of record/play/off options, as well as individual volume controls, for each of sixteen possible tracks. The step between volume levels is too large to permit subtle balancing of the tracks. Doing this requires modification of either the appropriate ADSR envelope or waveform. Turbo Traks is

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4. **DUMP Memory to screen/printer in Hex with Ascii on right side.**
5. **DISA disassembles Binary to screen or printer.**
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7. **HIDOS moves DOS to Language Card & continues operation of program.**
8. **/ is a one keystroke Catalog in addition to the original command.**
9. **DATE prints with any clock. Also File Dating with clock or manual.**
10. **FIND prints address's of hex found in 64k memory. Hidos cmd only.**

Compatible

All DOS entry addresses have been preserved. DOS is original length and compatible with most software. David-Dos II is copyable and creates fully copyable updated disks. DAVID-DOS II is licensed by programmers for inclusion in the software they sell. Init areas were used for David-Dos II. Works with all Apple IIs including IIe 80 Col, Franklin & Hard Disks, such as Corvus & Xebec. Requires 48K. Complete documentation for screen or printing and many utilities are on the disk.

All times in seconds. (Time Test programs available)		DAVID DOS-II	ProDOS	DIVERSI DOS	DOS 3.3
TEXTFILES (100 Sectors)	TSAVE	8.0	NO	NO	NO
	TLOAD	6.2	NO	NO	NO
(791 Strings,	WRITE	29.3	28.0	29.4	88.4
32 chars ea)	READ	24.3	16.3	24.3	83.8
	PRINT/READ	44.2	45.9	45.1	117.1
(442 Sectors, 7 x 5'00)	APPEND	142.3	142.9	151.1	1231.2
APPLESOFT (100 Sectors)	*SAVE	6.4	16.4	6.4	33.1
	LOAD	5.0	4.0	5.0	23.5
INTEGER (100 Sectors)	*SAVE	6.6	NO	6.6	33.4
	LOAD	4.9	NO	4.9	23.4
BINARY (100 Sectors)	*BSAVE	7.3	18.4	7.3	28.7
	BLOAD	5.8	4.8	5.8	24.5
48K PROGRAM SPACE	APPLESOFT	36,352	NO	36,352	36,352
(With 3 Bufs avail)	INTEGER	36,352	NO	36,352	36,352
	BINARY	36,352	34,816	36,352	36,352
64K PROGRAM SPACE	APPLESOFT	46,592	31,232	45,658	35,162
(With 5 Bufs avail)	INTEGER	46,592	NO	35,162	35,162
	BINARY	46,592	40,704	45,658	35,162
NUMBER OF DOS COMMANDS		37	29	31	28
CLOCK FILE DATING		YES	YES	NO	NO
MANUAL FILE DATING		YES	NO	NO	NO
ONE KEYSTROKE CATALOG		YES	NO	YES	NO
AUTO USE INTEGER CARD ANY SLOT		YES	NO	NO	NO

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not at all compatible with 4-Track files; a track is stored in a buffer area during the recording process and later merged with the other tracks. This allows better use of disk space for storage, but the merging process is complicated and can take a while. Other options available from the sequencer menu include looping, real time transposition, the creation of a metronomic "click" track to facilitate recording, and real time tempo control. A difficult piece can be recorded slowly and played back at a fast pace.

Notewriter and Polywriter

Notewriter is a real time music transcriber with editing features. It will not transcribe polyphonic music and in my opinion is not terribly useful. I can make better copies by hand. Polywriter, which I haven't seen, is touted as being able to produce easily readable (perhaps professional appearing) polyphonic transcriptions from the Soundchaser keyboard.

Music Tutor Series

This is an exciting series of programs designed to improve keyboard technique and general musical ability. Most are written with the professional educator in mind, but can also be used by individuals. My particular favorites are "Chords" and "Intervals," which includes ear training drills of ever increasing speed and complexity. In Soundchaser, a separate "Ear Teacher" utility allows a teacher to keep class progress records and permits students to learn at an individual pace. I very quickly went through the first levels of the guided interval drill, but started to have trouble telling tritones from major sevenths as the pace quickened. After a few more sessions I have noted a difference in my sight singing ability. Difficulty levels range from simple to complex to ridiculous. These three programs alone are good reasons for every college music department to own several Soundchaser systems, and there is absolutely no reason they couldn't be used by musically inclined and motivated grade schoolers.

"Notes and Keys" is a beginner's introduction to the musical staff, clefs, key signatures, and the piano keyboard. It would be a useful beginning for class piano students, or a lab requirement for a general music course. "Matching and Tuning" is another ear training utility for more advanced musicians who need practice in matching pitches and tuning both simple and complex chords. It would also be a helpful addition to a freshman music theory course. "Melodic Games" requires the user to remember and play back an ever-lengthening, and at times changing, series of notes in the manner of the "melodic dictation" part of a basic ear training course. Both Matching and Tuning, and Melodic Games, interface with the Ear Teacher utility for record keeping.

Recommendations

If you want the flexibility of having both human- and computer-controlled music from the same portable system, and don't want to spend a lot of money, the Soundchaser is for you. Remember that no synthesizer can exactly duplicate the sound of the Philadelphia Strings or any other live musical instrument, and that those which come close cost a mint.

The best way for an individual to start out is with the SC-100 "Basic" system, which includes all of the basic hardware and the 4-Track and Notewriter software. The "Home" package includes the basic system plus "Notes and Keys" and "Melodic Games," which would be nice for some beginners. Beyond the basic system, you may eventually want Traksplayer, as well as Turbo Traks and the 4-Track Editor. The "Special Tunings and Periodic Waveforms" utility disk is rather esoteric, but is also relatively cheap. If you don't want the experience of writing these programs yourself, go ahead and buy it. The entire education series is highly desirable for a school, and some individuals would also enjoy having these at home.

Soundchaser is not a toy. A toy could not come up with a credible rendition of a Bach Brandenburg concerto, or teach musical skills. I use my Soundchaser more than any other musical instrument or Apple peripheral. In addition to the fun I have making it reconstruct pipe organ sounds and compose Haydn dice minuets [*Ed. note: See related article on dice music in this issue*], I routinely employ my Soundchaser to test brass, organ, and choral arrangements, sometimes using the looping feature of Turbo Traks to play the same section over and over. Not even a skilled organist could do this. I have also used it as the continuo instrument in home chamber music sessions.

Soundchaser is a patient and always available rehearsal accompanist. Mine is capable of playing the Handel recorder sonati with me at whatever rehearsal or performance tempo I want, and its organ sounds are quite satisfying. Above all, it doesn't play louder than I do! I've never used it in a concert setting, but others are using it in rock bands.

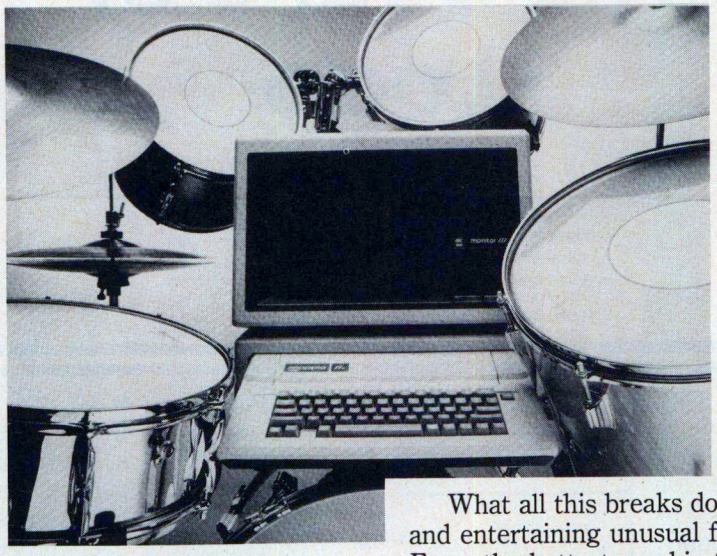
The Soundchaser system deserves a place in the music classroom. Although every school computer lab should have at least one (naturally with headphones), I think a musical beginner who wants a home instrument on which to learn keyboard technique might be better off with an inexpensive practice piano and a good piano teacher. The Soundchaser can come later.

SOUNDCHASER SYSTEM OPTIONS

SC-100 Basic System	$1270
4-Track Editor	$195
Polywriter	$495
Traksplayer	$75
Tunings and Waveforms	$50
Turbo Traks	$250
Notes and Keys	$195
Intervals	$99
Chords	$99
Matching and Tuning	$99
Melodic Games	$99
Ear Teacher	$99
MX-500 System	$1495

Drum-Key

Gary Kruger



PRODUCT: Drum-Key
USE: Percussion synthesizer
FOR: Apple II, II+, IIe
COMPANY: PVI
Great Valley Parkway
Malvern, PA 19355
INCLUDES: Firmware
Software disk
Manual
PRICE: $139

THE MAIN THRUST of my curiosity about this product is how well it simulates the real sounds of a drum set, or percussion ensemble. A device of this type is truly just a computerized rhythm ace, and the first thing that struck me as interesting about it was the wide array of genuine percussive instruments it simulates. Some twenty-eight sounds are available, but among the more esoteric and unusual are clave, congas, and a rimshot. When you consider the subsonic properties of a real percussion instrument, the sound-pressure level created by two opposed and tense skins, maybe nothing could ever simulate the real thing. Yet, the Drum-Key comes very close in duplication of sound, and could be an invaluable aid in recording. The obvious advantage of a percussion peripheral is the ability to have a competent drummer on hand without being one yourself, not to mention the steady beat of electricity instead of muscle.

Great mimicry is not the only feature of the percussion peripheral. The incredibly accurate duplication of sound was input from digital recordings. Songs and rhythm patterns are fully programmable, with a storage capacity of 100 patterns and 26 songs, with up to 250 patterns per song. In addition, hi-res graphics provide a fantastic way to scroll original percussion parts and learn a little music composition at the same time. A single pattern length can run up to 32 measures. Meter, time, and rhythm are completely adjustable through a wide variance of time signatures, including three-quarter and "cut" time. Selectable quantization with variable resolution provides 13 values from whole notes to 64th note triplets.

What all this breaks down to is some pretty exciting and entertaining unusual fun to be had with a II or *IIe*. From the hottest cumbia to the most swinging shuffle, the Drum-Key can offer the concise beat and sound on which to key the production of other instruments. All you need is your regular home audio setup or mono amplifier, and the Apple.

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The Sound of Logo

Jeff Sandys

ALTHOUGH Logo is usually thought of as a graphics tool, it is also a marvelous language for making music. Sound can be added to the most simple graphics procedure to make it more interesting. List processing can be used in music theory to study the sequences of notes, and recursive procedures can provide the rules for computer generated songs.

These techniques are demonstrated in the programs listed here, which are written for use with the Apple Logo NOTE primitive found on the Apple Logo Toolkit Disk. If you do not have this public domain disk, go to your Apple dealer and ask for a copy. After booting Apple Logo, then load the "MUSIC file from the Toolkit disk. You can now use the NOTE primitive. NOTE 60 400 will play the note C for about one second.

Turtles dance to the music.

Listing 1 defines the simple graphics programs SPI and DRAGON. You may have already used these common procedures. SPI draws a spiral if you use an angle that is not perfect. The turtle's heading is used to select the pitch. Since pitch number must be less than 109, the heading is divided by "QUO. Experiment with different values for "QUO or make up different functions. Here are some sample SPI's:

```
SPI 3 120
SPI 3 123
SPI 3 117
SPI 3  95
SPI 3 135
```

The dragon curve is a representation of a strip of paper folded in half. This is a recursive procedure somewhat like a binary tree. Using the level of the fold, the ITEM primitive selects a pitch from a list. Left folds choose from the left side and right folds choose from the right. Since every other fold is a level one, the end pitches get played most often. Start with DRAGON 1 and work up to DRAGON 9. Use ten numbers in the "NOTES list if you change it.

Sound is an added dimension to these graphics procedures, which can help hold the interest of children. The changes in pitch can provide insights into what is happening, since mathematics and music naturally go together. The next procedures use list processing to create the various scales.

Listing 1

```
TO SPI :SIDE :ANGLE
IF :SIDE > 180 [STOP]
FORWARD :SIDE RIGHT :ANGLE
NOTE (:LOW + QUOTIENT
   HEADING :QUO) :DUR
SPI :SIDE + :INC :ANGLE
END

TO DRAGON :LEVEL
MAKE "SIDE 4 * (10 - :LEVEL)
CS PU SETX -70 RT 45 * (2 +
   :LEVEL) PD
LEFTDRAGON :LEVEL
END

TO RIGHTDRAGON :LEVEL
IF :LEVEL = 0 [FORWARD :SIDE
   STOP]
LEFTDRAGON :LEVEL - 1
RIGHT 90 NOTE ITEM (10 -
   :LEVEL) :NOTES :DUR
RIGHTDRAGON :LEVEL - 1
END

TO LEFTDRAGON :LEVEL
IF :LEVEL = 0 [FORWARD :SIDE
   STOP]
LEFTDRAGON :LEVEL - 1
LEFT 90 NOTE ITEM :LEVEL
   :NOTES :DUR
RIGHTDRAGON :LEVEL - 1
END

MAKE "INC 3
MAKE "QUO 17
MAKE "LOW 40
MAKE "DUR 15
```

Practice your Do-Re-Mi's

A musical scale is a sequence of pitches. In Logo the pitches are numbers, and we can think of a scale as a list of numbers. Listing 2 defines some list processing procedures, the pitch numbers, and the scale lists. The procedure SCALE adds a number to all the elements of a list. REVERSE is used to change the order of a list. Since pitches are numbers, we can see how the procedures work. Here is an example:

```
?PRINT C
48
?PRINT MAJOR
0 2 4 5 7 9 11 12
?PRINT SCALE 50 [1 2 3 4]
51 52 53 54
?PRINT REVERSE [1 2 3 4]
4 3 2 1
```

The procedure SING is a command that plays a list of notes. The

variable "DUR sets the duration of the note; 400 is about one second. The pitches and scale names are procedures instead of variables. This allows the instructions to have an English sentence look without the dots for variables. Try these instructions:

```
SING SCALE C MAJOR
SING SCALE A MINOR
SING REVERSE SCALE G#
CHROMATIC
```

TO NASHVILLE . . .

Many songs are built from a basic theme that is repeated in different ways. A popular style is called *A A' B A*. The melody line has four parts: main theme, modified theme, different theme, main theme. The procedure SONG uses a list as a theme, modifies it with SCALE, and makes it different with REVERSE. The output of song is a list of numbers four times longer than the input.

Listing 3 is just a starting point for Logo-generated music. Add your own procedures to flip or scramble the theme. Use a theme created by SPI or a fractal procedure as a start. The easy-to-use editor and procedural structure of Logo make it ideal for this type of experimenting. Try these:

```
SING SONG [60 58 60 48]
SING SONG SONG [60 58 60 48]
```

Piano, guitar, violin, Apple, or whatever instrument you play, music is a wonderful outlet for creative thought. I hope these routines will give you new ideas for music on the computer. If you discover any other interesting procedures I would like to hear from you.

Terrapin Logo Additions

For Terrapin Logo users, the music procedures are found on the Utilities Disk. Boot Logo, then read the "MUSIC file. You will need to add the NOTE procedure and the list of pitch numbers that are used in Apple Logo. After the file has been loaded, create the pitch numbers with:

```
MAKE.OCTAVE 109 " 3.
```

The pitches between 30 and 80 will be on key. Pitch 60 is middle C. Add the new note procedure as follows:

```
TO NOTE :PITCH :DURATION
PLAY.NOTE :PITCH :DURATION
END
```

Listing 2

```
TO SCALE :N :LIST
IF EMPTYP :LIST [OUTPUT [ ] ]
OUTPUT SE :N + FIRST :LIST
   SCALE :N BF :LIST
END

TO REVERSE :LIST
IF EMPTYP :LIST [OP [ ] ]
OP SE REVERSE BF :LIST FIRST
   :LIST
END

TO SING :LIST
IF EMPTYP :LIST [STOP]
NOTE FIRST :LIST :DUR
SING BF :LIST
END

TO A
OP 45
END

TO A#
OP 46
END

TO B
OP 47
END

TO C
OP 48
END

TO C#
OP 49
END

TO D
OP 50
END

TO D#
OP 51
END

TO E
OP 52
END

TO F
OP 53
END

TO F#
OP 54
END

TO G
OP 55
END

TO G#
OP 56
END

TO CHROMATIC
OP [0 1 2 3 4 5 6 7 8 9 10 11 12]
END

TO MAJOR
OP [0 2 4 5 7 9 11 12]
END

TO MINOR
OP [0 2 3 5 7 9 10 12]
END

TO AEOLIAN
OP [0 2 3 5 7 8 10 12]
END

TO DORIAN
OP [0 2 3 5 7 9 10 12]
END

TO PHRYGIAN
OP [0 1 3 5 7 8 10 12]
END

TO LYDIAN
OP [0 2 4 5 7 9 11 12]
END

TO MIXOLYDIAN
OP [0 2 4 5 7 9 10 12]
END

TO CHINESE
OP [0 2 4 7 9 12]
END

TO AFRICAN
OP [0 2 5 7 10 12]
END

TO GREEK
OP [0 3 5 7 10 12]
END

TO INDIAN
OP [0 4 5 7 10 12]
END

MAKE "DUR 60
```

Listing 3

```
Use SCALE and REVERSE from
Listing 2.

TO SONG :LIST
OP (SE(:LIST)(SCALE 5 :LIST)
(REVERSE :LIST)(SCALE -5 :LIST) )
END

MAKE "DUR 30

MAKE "NOTES
[60 67 57 59 64 52 71 69 72 79]
```

A CONDUIT to Educational Software

Lee Webster

AFTER seeing an article in *Infoworld* (dare I mention a competing publication?), I sent for a demonstration disk of software from CONDUIT M310 Oakdale Hall, University of Iowa, P.O. Box C, Oakdale, IA 52319. There are three items of interest: (1) the method used by CONDUIT to let potential users see their software, (2) the way the software demo is conducted, and (3) the math software itself.

As everyone who has tried to find good educational software knows, it is difficult to see how a program works because most publishers won't allow you to see it "on approval"—the old pirate syndrome, you know! The abundance of poor educational software makes educators reluctant to blindly purchase software. CONDUIT sends the reviewer a demonstration disk containing a couple programs from several of their packages. This certainly gives you a chance to find out what the software looks like!

How is this demo disk set up? With help from Verbatim, CONDUIT is able to offer these demo disks for just the cost of postage and handling, $2.00! What you get is a diskette and a good vinyl binder. The disks are "...for limited use. When the demonstration programs are no longer available, a message will be displayed on your screen." That's fine, but they don't tell you how many times you can use it! I've used mine twice, and I'm not taking any chances. I'm going to wait until I have a group of my colleagues together so several can see it next time (in case it's the last!). Anyway, when no longer available, you still have a good disk left and the vinyl folder—not a bad deal for $2. The disk contains demonstrations which simulate user interaction; you don't really get a chance to run the program yourself. Still, you can see the screen displays, and based on the demo disk, you get a good idea of the software's purpose.

What about the software? I received the Math Demo Disk #2 which is designed for secondary/college level and contains samples of all six programs from two CONDUIT software packages, "Graphing Equations" and "Interpreting Graphs." Both packages were written by S. Dugdale and D. Kibbey of the University of Illinois. When starting the demo, you have a choice of color or B&W monitor. (I ran it on B&W with no problem.) Throughout the demo, a RETURN gets you to the next screen, and ESC allows you to back up—a good feature. You are presented with a menu to select which program you want to look at (you can interact at this level at least). The display is clear (upper/lower case) and reinforces you as you make selections.

The "Graphing Equations" demo has several text screens of reference material (which can be skipped), and then a menu of choices:

0 General Information
1 Linear & Quadratic Equations
2 Green Globs
3 Tracker
4 Equation Plotter

The General Information gives an overview of the programs. When you choose any of the other four items, you are presented with three things: text screens overviewing the program, text screens describing what the students will learn, and a sample sequence (simulates a student using the program—advances each time you press RETURN).

The "Linear and Quadratic Equations" program gives students drill on conic equations. They can choose to work on one type of equation or a mix and there are 20 levels of difficulty for each type. The program displays the coordinate system and then plots an equation. The student is to enter the equation which he/she thinks is the one plotted. The equation entered by the student is plotted—if it is the identical one, a message appears. With each successive entry of an equation, another is plotted until the student (hopefully!) gets the right one. If a student gets it right the first time, he/she moves up to the next level. Students can also ask for the answer if they get stuck, but this doesn't move them up a level.

"Green Globs" is an educational game. Thirteen globs are drawn randomly on the screen and the student writes an equation which will hit the globs. The more globs hit by a single equation, the more points scored. When a student misses, some diagnostic hints are given. The 10 top scores are stored on the disk and accessible for other students to see. The simulated interaction shows a "student" using the equation of an ellipse to hit four globs—you'd really have to know your conic equations to pull this one off!

"Tracker" is a game in which the student attempts to find the hidden graphs. There are several graphs "hidden" on the screen (but a maximum of two different types). Students use a "probe" (constant function such as X=3) which exposes any points on the hidden graphs if it crosses them. When enough points have been exposed, the student can use a "tracker" to try to go along the path of the hidden equation. Each

(Continued on page 57)

Northern Spy:

Surveying the Software Market

Rick Sutcliffe

LAST time we did an overview of some hardware trends. This month, let's consider what's going on in the software industry. Some important directions are emerging as the novelty of the home and small business computer wears off, and prospective authors will have to recognize and flow with these trends or the hundreds of hours coding SUPERPROGRAM II are going to lead nowhere.

Academia

The brave promise of vast outpourings of high quality educational software has remained a dream. It's not that there isn't a lot of software out there. Quite a number of packages tout that they will teach Johnny or Jane how to read, spell, add, solve linear and quadratic equations, do Calculus, and generally be a better all around person.

However, much of what is sold has been put together by:

a) students as a programming exercise. These packages are often poorly written from a technical point of view, and are nearly worthless for teaching value.
b) teachers who are just getting into programming. Here we get a lot of nicely conceived and pedagogically sound, but slow and very limited BASIC programs.
c) professional programmers who know all the tricks for producing fast, efficient programs with arcade quality graphics, but know nothing whatever about teaching. Programs coming from this group are usually pretty to look at, but educationally are of dubious value.

Actually, almost all the work comes from group (b). Very few people who make a living at this business will venture into the educational market because the rewards are too meager, piracy is rife, and teachers are generally difficult and unpredictable collaborators.

A few people are doing interesting things. The Minnesota Educational Computing Consortium (MECC) distributes some passable packages at reasonable prices.

One of their disks which I have (Elementary volume 7) is a favorite of Nathan and Joel. Called "Getting Ready to Read and Add," it consists of readiness games on numbers and the Alphabet. In one, a train is put together, coach by coach, for each correct answer. When Nathan had just turned four this was something he could spend hours at, even though he was able to play all six games in the first half hour with very little instruction.

The version I have came via Sunburst Communications and included a very extensive (perhaps overdone) teaching manual. The disk is protected and no backup is provided for the $30 price, but I would rate it as a fairly decent value.

At a higher level is Algebra Arcade from Wadsworth at $49.95. This is the first example I have yet seen of the synthesis of good instruction and excellent programming.

The game presents the student with "graph paper" containing ten algebroids and a graph gobbler. The object is to draw graphs which will intersect the algebroids while avoiding the gobbler.

The more algebroids taken out at each turn, the higher the score. Bonus turns can be won by scoring high on a turn, by removing the last of the algebroids, or later by finding the now hidden gobbler.

Any equation which can be written in BASIC (and a few others) can be entered as a function to graph. There is some solid Mathematics practice here as well as some good audio-visual effects. For a refreshing change, the manual is very well done.

Except for the fairly steep price ($50 for one disk, $15 for a back-up), this is one of the best done pieces of software of any type which I have yet encountered, and the first in either the game or educational category which I am prepared to recommend.

and *Arcademia*

Let's consider now what will be the least significant portion of the overall market in the long run — entertainment. The expected Christmas rush on games never really developed this year. This, combined with what was already a slow market for months, has left much of this part of the industry very depressed. What did anyone expect — that computers would continue to be novelty items indefinitely? No, the flush is off this part of the market, and while computer games will continue to play a role for a long time to come, their

relative share of the whole software market will decline to a small fraction of what it is now.

It is as difficult to create a first-class computer game as it is to invent a best-selling board game. Some old games will be given new twists — for instance, I once wrote a rather nasty version of Bagels in which the underlying colour set was rotated after each turn — but the top sellers will be those rare games which open up whole new creative vistas for the gamer.

Two trends are well-established and will continue to dominate this shrinking market. On the one hand, strategic simulations will continue to become more complex and demanding. Some will arrive at your doorstep complete with enormous data bases from which to construct their game situations. In addition, improved hardware will see further advances in the accompanying audio-visuals. Ultimately, we will have computer graphics of near broadcast quality. Mind you, that will require nearly unlimited memory; but in a very few years we will have this too.

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Circle 109 on Reader Service Card

Utilities

We could call this one the Beagle Bros. corner. Their ads and their work are fun, the customers feel they get their money's worth and keep coming back for more. They, and a handful of other houses, seem to have the whole (small and declining) utilities market to themselves.

There are, after all, only a small portion of computer users who are into using Amper utilities, modifying DOS and generally playing around with memory and disk drives. (You can do all of these things and more with my Ampermanager, which is available from A.P.P.L.E.)

While the absolute size of even this portion of the market will continue to grow, its relative importance will decline as more machines are sold to users rather than to hackers. This is not a bad thing; it simply reflects a maturation process.

Even now the best bargains in the industry can be found at the A.P.P.L.E. store and through other groups like it. Every small computer owner should belong to one or two each of local and national groups.

Down to Business

Next we come to the big winners' circle. The fact is that "business" today means computerized business. More and more companies are relying on the flickering screen to make decisions, disseminate information, advertise directly to their customers, obtain data, store records — you name it; it is in the electronic box.

Small computers will do most of this work in the future, and there is a great deal of room for good applications software. Indeed, this segment of the market has hardly begun to develop. What are some of the trends to watch for?

1) More integration of software. This can take two forms: either a common set of commands for a series of packages (word processor, spreadsheet, data base, and report generator) or at least a common framework within which the user can freely exchange data and move from one application to another with a minimum of grief. Companies such as Microsoft are showing us how this can be done.
2) A much greater sophistication even in single packages. Lisa and Macintosh show the way. Today's computer users want and should be able to get software that has virtually no limitations within its domain. As we begin to see machines with several megabytes of core memory in very small packages, the sophistication and completeness of software will grow exponentially.
3) Completely different distribution and updating methods will be found. One which seems promising is the magnetically encoded card. These can be produced for a few cents, will hold megabytes of information, and can be mailed out like credit cards. Updates are quick and easy, and can be placed in customers' hands quickly. We need hardware to read these things, and they are read-only devices, but they could bring distribution costs way down. Another possibility is fast electronic distribution over the telephone lines — but again, we must wait for hardware on this one, as 1200 baud simply will not do. (Direct satellite transmission anyone?)
4) Prices will come down dramatically, even as quality improves. Today's prices for applications software are ridiculously high. Tomorrow's software will be much more comprehensive, faster and more user-friendly, but will cost less than today's primitive, limited, and slow predecessors.

Languages

There are so many contenders to replace COBOL as king of the business computer world, I don't relish the idea of picking a winner. The best bet would be an upwardly compatible but much extended version of the same language — at least current applications would not need recoding. The consensus of my business computing contacts, however, is that COBOL is not adequate any more, and that there are fourth generation languages out there which can do a better job in the long run. Getting any one of them to achieve a broad acceptance is another matter, though.

For the academic community, I think the contest has already been won. Except for some Engineers and Physicists who know nothing else, FORTRAN's days have passed forever. Even the widely used and taught Pascal is showing its age and its limitations. Today, PL/1 and C are start-

ing to overtake it and could pass Pascal in popularity on the next stretch.

But wait! That dark horse coming rapidly up the track and breathing down hard on the others' necks is none other than ... Modula-2. I'm not a betting man, but here is where I would put my money.

In the meantime, a good value may be the widely advertised JRT Pascal. At $29.95, it is priced right, and seems to offer a fair implementation of the language. You need a CP/M card to run it, and no text editor is supplied.

And what about BASIC? Its obituary has been written many times — all premature. Consider Waterloo structured BASIC (alas, only on the PET so far as I know), and the much extended HP BASIC for their 9816. (A fine 68000 implementation, by the way.) No, I think it will be with us in some form for a long time.

Telling It Like It Is

The one aspect of the software industry which remains a perennial disgrace is its documentation. There has been a slight improvement in recent years, but only on a percentage basis. Higher volume has only meant that even more terrible writing has been inflicted on us. Standards for good documentation simply do not exist.

Let's face it folks. On the one hand we have the professional Mathematicians and Computer Scientists, who are used only to talking to each other in what to everyone else is unintelligible jargon. Our unreadable textbooks have created generations to become Mathephobes, and we are now making a similar contribution to the way people feel about computers.

On the other hand, most hackers cannot write at all. The situation is hardly improved when some enthusiastic lawyer or business friend undertakes to write the document instead. One need not look far among some heavily promoted products for numerous dreadful examples of this sort of thing.

Mark my words. The big money makers of the future — the survivors — will be those who train the best technical writers (and pay them the royalties they deserve) to produce clear, readable manuals which are a joy to learn from.

The Vendors

I am not sure that the present software distribution system has many years left. Applications software and the larger integrated systems packages can be sold either by specialty or manufacturers' stores. Games can (and will) be sold in department and drug stores over the toy counter, and smaller packages and utilities are best sold by mail or telephone.

Where does that leave today's retailers? It leaves them out. Even now, there is not enough volume for any but the best sellers to be carried even by the largest retail software specialists, let alone the general computer store. In smaller cities, forget altogether about finding retail software.

This means much more bundling of software by manufacturers (for Users) and an increase in mail order purchasing at the expense of both general retailers and wholesalers. Five years from now, most computer hardware purchases will include a bundle of software, and few who buy these will obtain even one more program from the same store.

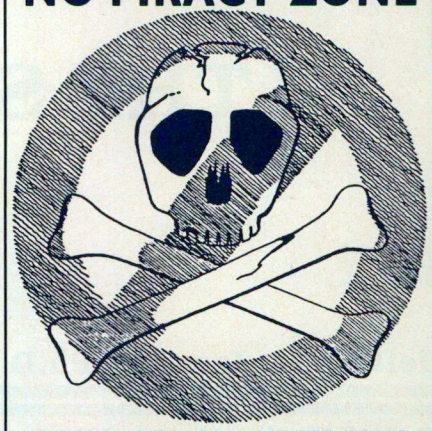
We will soon see more bundling of software itself, with two or three compatible applications programs offered together, with perhaps some key hardware thrown in. Micropro is leading the way here, by offering Wordstar with the Applicard and CPM — a very good deal. Down the road, combinations like Word Processing/Mailing/Spelling or Data Base/Report Generator/Spreadsheet will become the rule rather than the exception. They will be offered together for prices less than some of the single applications sell for today.

A Long (?) Road

We can look back less than a decade and see the whole road we have travelled with microcomputers. The software market is lagging well behind the changing hardware market. We are in for some fascinating and exciting times as programmers develop the expertise to take advantage of the hardware which has come on the market in the last few years.

The 8/16/32 bit progression is but one example of the exploding power of today's machines — a power which today's software can take advantage of in only a band-aid fashion. When we really get serious about exploiting this power, the whole industry is going to be turned on its head (again).

NO PIRACY ZONE



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THE Spreadsheet Sheet

Data Analysis #7

Jeffrey M. Jacques, Ph.D.

LAST time we began our discussion of inferential statistical procedures which may be used to generalize, within certain probability limits, our sample statistics to the population of interest. We examined how to use one of these statistical procedures (the chi square statistic) to test for significant differences between our sample statistics and the population parameters — i.e., to test for sample bias.

This time we will explore further the uses of the chi square test. More specifically, we shall use it to examine statistical independence or, try to answer in a reliable way: Do different attributes of the independent variable have different values on the variable of interest? For example, based on our random sample data: Do male and female faculty who work at the same college earn significantly different salaries? Hold different ranks? etc.

Earlier, we noted the importance of examining statistics which report proportionate reduction in error — the degree to which we can reduce the errors in predicting the variable of interest when we know the joint distribution of the variable of interest and the explanatory variable(s). These descriptive statistics, however, did not reveal if the patterns observed in the contingency table were sufficiently reliable for us to infer that these patterns existed in the population. This time we will begin our exploration of this question and continue it through the next article.

Chi Square and Tests of Statistical Significance — Two Variables

The chi square test is a very powerful statistical procedure which may be used to evaluate whether or not observations made from the random sample differ, within certain probability limits, from those we would have expected by chance. Last time we determined the expected frequencies on the basis of the population parameter — e.g., proportion of male and female faculty.

While it is often easy to find other sources which report summary parameters such as the sex or race distribution of a particular population, it is often impossible to know the true parameters of any joint distribution. For example, working with our faculty random sample, we know that 60% of the female faculty earned $16,000 per year or less while 60% of the male faculty earned more than $16,000. We have no independent information, however, whether or not these differences between male and female faculty exist at this college for all the faculty. This leads to the question: Based on our random sample, what can we conclude about the likelihood that this distribution holds true for the total faculty?

In order to answer such questions, we must first estimate how many female and male faculty earned above and below the $16,000 income. We can estimate these expected cell frequencies from knowledge of the marginal totals and the number of cases in the random sample. Given what we know from our random sample data: (1) 10 faculty earned $16,000 or less per year and 10 faculty earned more than $16,000, (2) 10 of the faculty were female and 10 were male, and (3) there were a total of 20 faculty in the random sample, then the expected cell frequency can be estimated from the equation:

$$\text{Expected Frequency}_{\text{Cell}} = \text{Total}_{\text{row}} * \text{Total/N of Cases}_{\text{column}}$$

A contingency table may be of some help:

Faculty Salary by sex

Salary	Sex: Female	Sex: Male	Total
<=$16,000	a	b	e
>$16,000	c	d	f
Total	g	h	N of cases

Therefore, to compute the expected cell frequency requires:

$$\text{Expected}_{a} = e * g / \text{N of cases} \quad (10*10/20 = 5)$$

$$\text{Expected}_{b} = e * h / \text{N of cases} \quad (10*10/20 = 5)$$

$$\text{Expected}_{c} = f * g / \text{N of cases} \quad (10*10/20 = 5)$$

$$\text{Expected}_{d} = f * h / \text{N of cases} \quad (10*10/20 = 5)$$

After solving these equations, we may check to see that the sum of the observed cell frequencies was equal to the sum of the expected cell frequencies.

Once the expected cell frequencies have been determined, we may find the computed chi square value in the usual manner:

$$\text{Chi square} = \sum_{i=1}^{N} \frac{(\text{Observed}-\text{Expected})^2}{\text{Expected}}$$

(Although, when working with a 2X2 table, there are more efficient and algebraically equivalent formulae, we will continue to follow our earlier pattern of using the most general and

Table 7.1 WORKSHEET FOR CHI SQUARE TEST AND SUMMARY CROSSTABULATION STATISTICS

	H	I	J	K	L	M	N	O	P	Q
39		Crosstabulation of :	Income by Sex							
40										
41			Sex							
42	Income					Total				
43		Female		Male						
44										
45		N	Pct.	N	Pct.	N	Pct.			
46										
47	<=16000	6	60	4	40	10	50			
48										
49	>16000	4	40	6	60	10	50			
50										
51	Total	10	100	10	100	20	100			
52										
53	Chi Square with (1 df) =		+J71#;sig.= @LOOKUP(L53,L66...L76)							

	H	I	J	L	M
61		Chi Square Computational Space			
62					
63	Obser.	Expt.	Cell X^2	Lookup Crit.Vl	Table Signif
64					
65					
66	+I47	(M47*I51)/M51	@IF(I66=0,0,(H66-I66)*(H66-I66)/I66)	0	1
67	+I49	(M49*I51)/M51	@IF(I67=0,0,(H67-I67)*(H67-I67)/I67)	.0158	.9
68	+K47	(M47*K51)/M51	@IF(I68=0,0,(H68-I68)*(H68-I68)/I68)	.0642	.8
69	+I49	(M49*K51)/M51	@IF(I68=0,0,(H68-I68)*(H69-I69)/I69)	.148	.7
70				.455	.5
71	@SUM(H66.H69)	@SUM(I66.I69)	@SUM(J66.J69) Tot.	1.074	.3
72				1.642	.2
73				2.706	.1
74				3.841	.05
75				5.412	.02
76				6.635	.01
77					

Note: Columns do not align and there are several missing rows which you should have in your worksheet from Article 4. Presented here are the additional equations which are needed to complete the crosstabulation table and summary statistics.

\# In cell I53, you would be well advised to enter: @IF(H71=I71,J71,@ERROR)

conceptually meaningful ones. This is especially appropriate since we will be able to generalize to other table sizes, and the total time saved by such equivalent formulae, when using *THE Spreadsheet,* will be a second or two.)

In order to compare the computed chi square value to the tabular critical value, all you need know are the number of degrees of freedom. It can be determined quickly by using the following formula:

degrees of freedom = (N of Attr. in Var of Interest - 1) * (N of Attr.in Explanatory Variable - 1)

where N of Attr. = number of different attributes.

In this case :

degrees of freedom = (2 - 1) * (2 - 1) = 1

By working with the known degrees of freedom and the computed chi square value, we can determine the level of significance with the use of an appropriate lookup table.

Modifying the Crosstabulation Worksheet for the Chi Square Test

In the fourth installment we developed a worksheet which displayed a crosstabulation and computed the appropriate descriptive statistics (e.g., lambda, gamma, Pearsonian R^2, etc.). In this article we shall modify this worksheet. So, take a minute and load it. I'll wait...

In row 53, we shall report the essential chi square information. So, beginning with column H and ending in column K, enter the phrase: "Chi square with (1 df) = ". (Since we are working only with a 2X2 contingency table, the number of degrees of freedom will always be 1.) We shall use cell L53 to report the computed chi square value, so enter: +J71. Cell M53 and M54 shall be used to report the level of statistical significance, so, as last time, enter the phrase "; sig.=" in cell M53. We'll place the @LOOKUP function in cell N53 — but read on before entering it.

Beginning in row 61, we shall first create a computational table and then a lookup table for our chi square statistic. Column H will be used to repeat the observed frequencies; column I will be used to compute the expected cell frequencies with the expression (for cell I66):

(M47*I51) / M51

where M47 is the row total (e.g., all faculty with incomes $16,000 or less), I51 is the column total (e.g., all female faculty), and M51 is the total number of cases. Other expected cell frequencies are found by references the appropriate tabular cells. See Table 7.1.

The cell contribution to the overall chi square value is computed with the equation (e.g., in cell J66):

@IF(I66 = 0,0,(H66-I66)* (H66-I66)/I66)

The remaining @IF statements and expected cell frequency equations were found by using the /Replicate command and editing. Each computational column is @SUMmed in row 71.

In cell L53, the computed chi square value can be reported with +J71, but I suggest that you use the following equation:

@IF(H71 = I71,J71,@ERROR)

If the sum of the observed and expected cell frequencies are equal, then report the computed chi square value. If they are unequal, then report @ERROR. This will catch some of the possible problems and help insure that you have listed the correct cells in column I. Finally, after building your lookup table in columns L (e.g., critical values) and M (e.g., significance levels), enter @LOOKUP (L53,L66...L76) in cell N53. A simple press of the ! key will complete the operation. Check your results with those listed in Table 7.2.

From these sample results, then, the salary differences between male and female faculty at this institution are not sufficiently reliable to be considered statistically significant. True differences, however, may exist. A larger sample may show these differences to be reliable. A different statistical procedure may also indicate a greater degree of reliability in these differences. But for now, based on these random sample data and this procedure, no significant differences are noted. *(Continued on page 42)*

When Apple Revealed the *IIc*: Did the Earth Move?

(Continued from page 5)

This month, with the benefit of information gained at the San Francisco extravaganza, we'll examine some aspects of the *IIc*—including Apple's marketing strategy—that will have a major influence on its ultimate success.

What Does the "c" Stand For?

Those of us who share some interest in the innards of a computer may be satisfied to know that one meaning of the letter refers to the 65C02 microprocessor. This chip replaces and slightly improves upon the old workhorse 6502 that we have come to know and love in earlier Apples and other computers. In answering the question however, a non-technical employee would undoubtedly wax eloquent with a string of c-words, including compact, convenient, complete, and comprehensible.

Compact

Upon seeing the *IIc* in person, one of the first things that hits you is its diminutive size and weight. You'd hardly contemplate picking up one of the older Apple models in one hand and turning it over to see what's underneath. Yet the *IIc* seems to invite such treatment! Its compactness is the result of a major streamlining effort that reduced the number of components by two-thirds, as compared to the *IIe*, and even left room for a thinline 5¼ inch disk drive inside the light, plastic case. It's not quite a pocket computer, but it is a full-featured Apple II that, to the uninitiated, could almost be mistaken for a toy.

Convenient

A most obvious symbol of convenience is the attached, plastic carrying handle that doubles as a tilt-stand. It invites you to see yourself marching off to the woods or beach with a boom-box dangling from one hand and a *IIc* from the other. The built-in disk drive reinforces the feeling that everything you'd need for computing, other than a few disks, is in that plastic case.

Of course there is one little detail that you won't be able to overlook—plugging it in. Unlike previous Apple II s, the *IIc*'s AC to DC power supply is contained in an external box that weighs a few additional pounds (but doesn't have its own handle). Curiously, this little item is rarely shown in Apple's promotional photographs. One brochure suggests that you buy extra ones for home or office so that only the computer itself need be toted from place to place. A further limitation on complete portability is that you'll need a monitor, TV, or printer wherever you use the *IIc*.

Apple sometimes uses the term "transportable" to distinguish the *IIc*'s degree of partial mobility from the total freedom implied by "portable." Yet the design of the *IIc* does not entirely rule out true portability. As Apple and other suppliers come out with promised battery packs, automobile converter plugs, and liquid crystal display (LCD) monitors, users could have a full-featured computer without the AC umbilical cord.

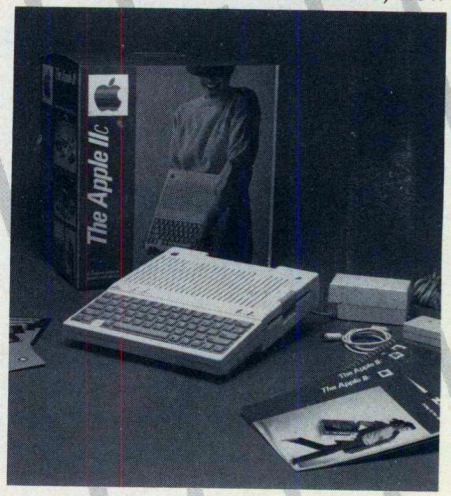
Complete

To achieve the *IIc*'s compact design, Apple traded off one of the most useful features found in other Apple II's—the internal expansion slots. Before sealing the package, however, nearly all of the options most commonly used in those slots were built right into the *IIc* hardware: 128K of RAM, 80-column screen output, serial interface, hand controller interface, second disk drive port, etc. Apple claims that only the most highly specialized or technically-oriented users would feel limited by the *IIc*, and for them the *IIe* will always be available.

Comprehensible

It's a good thing "user-friendly" doesn't start with c because Apple had to come up with a new word to signify ease of use. The difficulty with which a novice can learn to understand and operate a computer depends on two things—the simplicity of user actions required by the operating system, and the clarity of documentation and tutorial support. While the Lisa and Macintosh address this problem by creating new operating environments, the *IIc*, in order to remain true to existing Apple II software, relies entirely on support documentation. Packaged with the *IIc* is one of the most attractive and clearly written introductory computer manuals ever produced. (We would have said this even if it hadn't included *Call -A.P.P.L.E.* in its list of recommended periodicals.) Apple Computer is also sponsoring or encouraging other entry-level books that should be available soon.

Also included in the *IIc* package is a set of five starter disks that are intended to give beginners an initial boost in a palatable way. For example, one disk has a *IIc* version of the popular "Apple Presents Apple." Others introduce BASIC, Logo, and various common applications. Though most of these tutorials provide only a small taste of what is available, new



users will at least get an idea of what types of software to look for as their needs expand.

And That's Not All . . .

Even without help from the Cookie Monster, it's not hard to come up with other c-words that are relevant to the Apple *IIc*. Some people may see it as *cute* and *cuddly*. Others might even consider it *creative*. There's also the new *color* printer, and the overseas factory in *Cork*, Ireland. From the point of view of the potential buyer, there are three more descriptive words that should be considered.

Conventional

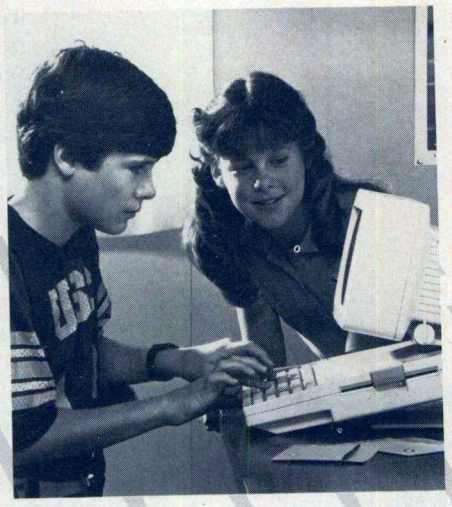
As the *IIc* was explicitly built around the concept of compatibility (another overused c-word) with existing Apple II software, there is little about the *IIc*'s operation that is clearly innovative. From the 5¼ inch disk format to the tiny, internal speaker (albeit accompanied by a volume control and external earphone jack), what we have here is essentially a *IIe* in a smaller, lighter package.

The analogy made by the Apple folks to the Volkswagen Beetle seems apt. That car evolved incrementally over several years, retaining a distinctive structure and operating system while always providing reliable service and good value. By the same token, the widespread implementation of other Apple II s should constitute a solid background for immediate acceptance of this latest version.

Eventually, the VW Beetle was displaced by newer technologies. Pressures for increased economy, crash-resistance, efficient use of space, and state-of-the-art features may take their toll on the Apple II family as they did on the VW. While the Apple II may not literally be forever, the *IIc* will undoubtedly extend its life. If you buy one, just be aware that the essence of the system is technology from the 1970's.

Consumable

After one look at the *IIc*'s packaging you'll have no doubt that this is a product designed for the mainstream consumer market. The bright red and yellow color scheme, checkered with smiling pictures of young families at work and at play, has obviously been carefully molded for eye-catching appeal. What's inside the box, as described above, has been put together with great care to be a self-contained, take-it-home-and-plug-it-in product. It would be easy to imagine this package being wheeled out of your local supermarket or discount store in a shopping cart, though Apple insists that distribution will be limited to "full-service" retailers.



Generally speaking, successful marketing requires not only a well-designed product in an attractive package, but also effective advertising targeted at the appropriate population. Included in the *IIc* formula is a massive $15 million ad campaign that over several months will blanket prime-time TV, radio, and general print media (*Time, Newsweek,* etc.) as well as computer-specific publications. The ads are clever and well-produced. From all signs, Apple Computer is going after a mother lode in the broad-based market whose surface has already been scratched by such low-priced computer makers as Commodore. Yet, the money for all this expensive market development and advertising has to come from somewhere, which brings us to one last c-word:

Costly

Whether the $1295 price tag seems exorbitant or irresistible depends on one's point of view. Along with other aspects of their product introduction strategy, Apple has given careful consideration to the *IIc*'s "marketing position," which is the balance among price, features, usefulness, and public image in relation to the competition. If you consider the prime competitors to be IBM's PC and PCjr, then the *IIc* system's cost is quite reasonable. Even stacked against Apple's basic *IIe* which has only a 40-column video display and one disk drive for under $1,000, the *IIc* with its many built-in features and portability is a bargain.

The *IIc*'s lively packaging and broad-based advertising give a definite impression that Apple is also aiming at the low-end home computer market that has been dominated for nearly two years by Commodore. Since a C-64 system with one disk drive (plus superior sound and graphics) can be picked up for under $500, the *IIc*'s $1300 price may seem way out of line. To be sure, the *IIc*'s extra RAM, built-in drive, and carrying handle are nice, but will the masses of new computer buyers see these features as worth the difference? Even Apple's advantage in software availability has been narrowed by a recent surge in third-party development for the Commodore 64. Financially-pressed consumers may take comfort in the fact that the efficiently-designed *IIc* costs less to mass produce than the *IIe*. We have no direct pipeline into Apple's long-range strategy, but don't be surprised if there's a significant price drop in a few months—once the initial advertising costs have been covered.

Seismic Rumblings

Only time will tell if Apple's newest product can shake up the personal computer industry as much as its developers hope. One omen came in the midst of the April 24th show when a genuine earthquake noticeably shook the San Francisco area. In fact, the epicenter was not too far from Apple's Cupertino headquarters. There was some speculation that John Sculley himself had arranged it, but it's doubtful that even Apple's ample promotion budget was quite that large. In any event, we have it on good authority that the *IIc* was built to survive at least an 8.0.

Table 7.2 WORKSHEET FOR CHI SQUARE TEST AND SUMMARY CROSSTABULATION STATISTICS

	H	I	J	K	L	M	N	O	P	Q
39		Crosstabulation of :		Income by Sex					Comp.	Space
40										
41			Sex						Pearsonian r	
42	Income					Total				
43		Female		Male					mean Y=	.5
44									sd Y =	.51299
45		N	Pct.	N	Pct.	N	Pct.		mean X=	.5
46									sd X =	.51299
47	<=16000	6	60	4	40	10	50		cpd x&y	1
48									var X =	5.0000
49	>16000	4	40	6	60	10	50		slope =	.20000
50									intcpt=	.40000
51	Total	10	100	10	100	20	100		r =	.20000
52										
53	Chi Square with (1 df) =			.8;sig.=		.5			Eta Squared	
54	Asym. Lambda (with Income dependent) =					.2				
55	Gamma = .384615								mean Y=	.5
56	Pearsonian r =	.2		R^2 =	.04				TSS =	5.0000
57	intcpt=	.4							meanY0=	.4
58	slope =	.2							meanY1=	.6
59	Eta =	.2		Eta^2 =	.04				ESS =	.2
60									Eta^2 =	.04000
61		Chi Square Computational Space							Eta =	.20000
62										
63	Obser.	Expt.	Cell X^2		Lookup Table					
64					Crit.Vl	Signif				
65										
66	6	5	.2		0	1				
67	4	5	.2		.0158	.9				
68	4	5	.2		.0642	.8				
69	6	5	.2		.148	.7				
70					.455	.5				
71	20	20	.8 Tot.		1.074	.3				
72					1.642	.2				
73					2.706	.1				
74					3.841	.05				
75					5.412	.02				
76					6.635	.01				
77										

Note: This table was created by modifying an earlier worksheet.

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(Continued from page 39)

Template for Crosstabs — A Better Mousetrap

Since most of the variables with which you will be dealing will have four or fewer attributes or categories, then a master data entry and statistical summary table may be created. Why are four categories a reasonable limit? Two reasons. First, most statisticians note that the expected cell frequency of each cell should generally (80% of the time) be 5 or more. With four categories for each variable — a total of 16 cells, and using 5 frequencies as the typical minimum, the sample size would need to be about 300 cases when you wished to use more than four categories for each variable. You are rapidly approaching the reasonable limits of this type of software with this many cases. The second reason is more direct. Many variables have either four or fewer attributes, and variables with more than 4 attributes can usually be summarized with 4 or fewer categories. Thus four categories is an appropriate choice.

We will identify specific areas of the template for (1) data entry, (2) summary statistics, (3) computational space and (4) a lookup table of chi square critical and significance values. Therefore, the top part of the template shall be reserved for data entry and summary statistics, the middle for computational equations, and the bottom for the lookup table.

The data entry table was constructed so that for each attribute of the variable under consideration you must enter and replace the @NA with the appropriate observed value. This includes zeroes, when necessary. Once completed, with three presses of the ! key, the data are then checked, and essential statistics are calculated automatically.

In order to do this efficiently, each frequency cell of the data entry portion of the template has the function @NA . This function is useful since it is treated as a value and, therefore, may be checked with appropriate @IF statements. First, we shall check and count the number of valid row and column cells used for each variable. Then, after assigning row cell values and column cell values, and automatically replicating observed frequencies, the total row, column and expected cell frequencies are computed (rows 35 through 55). Once the chi square contribution of each cell is computed (columns G and H), they are then @SUMmed in row 55. Rows 57 and 58 are used for the @LOOKUP function, along with the appropriate @IF statements, and then the @MAX value of statistical significance is stored in cell H58. Since the number of degrees of freedom may be as large as 9, the lookup table has become quite large. See rows 95 through 114. All the appropriate values for reporting chi square are summarized in row 17 of the table. See Table 7.3.

The bivariate descriptive statistics of asymmetric lambda, gamma, Pearsonian r and eta squared are listed in rows 60 through 93. The descriptive values are then reported in a summarized fashion in rows 18 through 22. These computations follow the same procedures as those outlined previously.

Once the template is created, all you need do is enter the observed frequency data and then press ! key three times. All the appropriate statistics will be computed. If you choose to create this general template, then, you would use your initial worksheet to count the observed frequencies for each cell, then load this template and replace the appropriate @NA values

TABLE 7.3. GENERAL TEMPLATE FOR CROSSTABULATION ANALYSIS

	A	B	C	D	E	F	G	H	I	J	K	L
1			Template for Contingency Table Analysis									
2												
3					Data Entry Table							
4												
5					TABLE enter# , depvar by ind var							
6												
7				Attr. #1		Attr. #2		Attr. #3		Attr. #4		Total
8	Var of Interest											
9				Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
10												
11	Attrib.	#1.		@NA	+C11/E38*100	@NA	+E11/E42*100	@NA	+G11/E46*100	@NA	+I11/E50*100	+D38	+K11/F38*100
12	Attrib.	#2.		@NA	+C12/E38*100	@NA	+E12/E42*100	@NA	+G12/E46*100	@NA	+I12/E50*100	+D39	+K12/F39*100
13	Attrib.	#3.		@NA	+C13/E38*100	@NA	+E13/E42*100	@NA	+G13/E46*100	@NA	+I13/E50*100	+D40	+K13/F40*100
14	Attrib.	#4.		@NA	+C14/E38*100	@NA	+E14/E42*100	@NA	+G14/E46*100	@NA	+I14/E50*100	+D41	+K14/F41*100
15	Total			+E38	@SUM(D11.D14)	+E42	@SUM(F11.F14)	+E46	@SUM(H11.H14)	+E50	@SUM(J11.J14)	@IF((C15+E15+G15+I15) =@SUM(K11.K14), @SUM(K11.K14),@ERROR)	@SUM(L11.L14)
16													
17	Chi^2	with	(| +H33)	df =	+H55; sig. =		+H58	@IF(H35<>H37,@ERROR,@NA)				
18	Asymetric Lambda		with	Enter VI		dependent =		+G62					
19	Gamma			=>		+E76							
20	Pearsonian R =			+G83		R^2	=>	+G84					
21		intercept=		-H21*C80+C79		slope	=>	+G80					
22	Eta	=		@SQRT(H22)		Eta^2	=>	+G93					
23													
24													
25													
26				Computational Space									
27													
28												Total	
29	N. of valid row cell			@IF(@ISNA(C11),0,1).....@IF(@ISNA(C14),0,1)								@SUM(C29.F29)	
30													
31	N. of valid col cell			@IF(@ISNA(C11),0,1).....@IF(@ISNA(F11),0,1)								@SUM(C31.F31)	
32													
33	Degrees of freedom										=>	@IF(@AND(H29>1,H31>1),(H29-1)*(H31-1),@ERROR)	
34	A	B		C		D		E		F	G	H	
35	Cell	Cell		Observed		Row		Column		Expected	O-E	Cell	
36	row	column		Freq.		Total		Total		Freq.		Chi Sqr.	
37													
38	1	1	@IF(@ISNA(C11),0,C11)	+C38+C42+C46+C50		@SUM(C38.C41)		+D38*E38/C55		+C38-F38		@IF(F38=0,0,638*638/F38)	
39	2	1	@IF(@ISNA(C12),0,C12)	+C39+C43+C47+C51		@SUM(C38.C41)		+D39*E39/C55		+C39-F39		@IF(F39=0,0,639*639/F39)	
40	3	1	@IF(@ISNA(C13),0,C13)	+C40+C44+C48+C52		@SUM(C38.C41)		+D40*E40/C55		+C40-F40		@IF(F40=0,0,640*640/F40)	
41	4	1	@IF(@ISNA(C14),0,C14)	+C41+C45+C49+C53		@SUM(C38.C41)		+D41*E41/C55		+C41-F41		@IF(F41=0,0,641*641/F40)	
42	1	2	@IF(@ISNA(D11),0,D11)	+C38+C42+C46+C50		@SUM(C42.C45)		+D42*E42/C55		+C42-F42		@IF(F42=0,0,642*642/F42)	
43	2	2	:	:		:		:		:		:	
44	3	2	:	:		:		:		:		:	
45	4	2	:	:		:		:		:		:	
46	1	3	@IF(@ISNA(E11),0,E11)	+C38+C42+C46+C50		@SUM(C46.C49)		+D46*E46/C55		+C46-F46		@IF(F46=0,0,646*646/F46)	
47	2	3	:	:		:		:		:		:	
48	3	3	:	:		:		:		:		:	
49	4	3	:	:		:		:		:		:	
50	1	4	@IF(ISNA(F11),0,F11)	+C38+C42+C46+C50		@SUM(C50.C53)		+D50*E50/C55		+C50-F50		@IF(F50=0,0,650*650/F50)	
51	2	4	:	:		:		:		:		:	
52	3	4	:	:		:		:		:		:	
53	4	4	@IF(ISNA(F14),0,F14)	+C41+C45+C46+C50		@SUM(C50.C53)		+D53*E53/C55		+C53-F53		@IF(F53=0,0,653*653/F53)	
54													
55	Total			@SUM(C38...C53)		@SUM(D38...D53)		@SUM(E38.E53)		@SUM(F38.F53)		@SUM(638.653)	@SUM(H38.H53)

TABLE 7.3. GENERAL TEMPLATE FOR CROSSTABULATION ANALYSIS-Continued

```
      A      B                C                                D      E      F                                G                                H
56
57 Significance Level  @IF(H33=1),@LOOKUP(H55,A100.A113),0)  ..........................  @IF(H33=2),@LOOKUP(H55,C100.C113),0)
58                     @IF(H33=6),@LOOKUP(H55,K100.K113),0)  .. @IF(H33=9),@LOOKUP(H55,Q100.Q113),0) => @MAX(C57.657+@MAX(C58.658)
59 ---------------------------------------------------------------------------
60                              Bivariate descriptive Statistics
61 ---------------------------------------------------------------------------
62 Asymetric Lambda                  =>                    =        (@MAX(C38.C41)+@MAX(C42.C45)+@MAX(C46.C49)+@MAX(C50.C53)-
                                                                    @MAX(D38.D41))/(C55-@MAX(D38.D41)
```

```
63 Gamma                          =>                                  +E76
64          FR. agree                                  FR.disagr
65          ------------------------------------------ ------------------------------------------
66          +C38*(C43+C44+C45+C47+C48+C49+C51+C52+C53)  +C50*(C39+C40+C41+C43+C44+C45+C47+C48+C49)
67          +C39*(C44+C45+C48+C49+C52+C53)             +C51*(C40+C41+C44+C45+C48+C49)
68          +C40*(C45+C49+C53)                         +C52*(C41+C45+C49)
69          +C42*(C47+C48+C49+C51+C52+C53)             +C46*(C39+C40+C41+C43+C44+C45)
70          +C43*(C48+C52+C49+C53)                     +C47*(C40+C41+C44+C45)
71          +C44*(C49+C53)                             +C48*(C41+C45)
72          +C46*(C51+C52+C53)                         +C42*(C39+C40+C41)
73          +C47*(C52+C53)                             +C43*(C40+C41)                  Gamma
74          +C48*(C53)                                 +C44*(C41)                      Value
75          ------------------------------------------ ------------------------------------------ ------------------
76          @SUM(B66...B74)                            @SUM(D66...D74)                 (B76-D76)/(B76+D76)
```

```
    A      B                C                  D                          E                          F                  G
77
78 Pearson r
79          Mean Y =  (1*D38)+(2*D39)+(3*D40)+(4*D41)/C55  cpd => ((1-C80)*(1-C79)*C38)+((1-C80)*(2-C79)*C39)+  var inX= (((1-C80)^2)*E38)+(((2-C80)^2)*E42)
                                                                 ((1-C80)*(3-C79)*C40)+((1-C80)*(4-C79)*C41)            +(((3-C80)^2)*E46)+(((4-C80)^2)*E50))
80          Mean X =  (1*E38)+(2*E42)+(3*E46)+(4*E50)/C55      => ((2-C80)*(1-C79)*C38)+((2-C80)*(2-C79)*C39)+  slope =  +E83/G79
                                                                 ((2-C80)*(3-C79)*C40)+((2-C80)*(4-C79)*C41)
81                                                             => ((3-C80)*(1-C79)*C38)+((3-C80)*(2-C79)*C39)+  sd Y  =  @SQRT(((1-C79)^2)*D38)+(((2-C79)^2*
                                                                 ((3-C80)*(3-C79)*C40)+((3-C80)*(4-C79)*C41)             D39)+(((3-C79)^2)*D40)+(((4-C79^2*
                                                                                                                         D41)/(C55-1)
82                                                             => ((4-C80)*(1-C79)*C38)+((4-C80)*(2-C79)*C39)+  sd X  =  @SQRT(G79/(C55-1)
                                                                 ((4-C80)*(3-C79)*C40)+((4-C80)*(4-C79)*C41)
83                                                      sum cpd= @SUM(E79...E82)                                   r    =  +G82/G81*G80
84                                                                                                                 R^2  =  +G83^2
85
```

```
      A      B      C                          D                          E                          F                          G
86 Eta Square        WhereX=1                   WhereX=2                   WhereX=3                   WhereX=4                   Grand
87                   Mean Y1                    Mean Y2                    Mean Y3                    Mean Y4                    Mean Y
88 ---------------------------------------------------------------------------------------------------------------------------------
89                   @IF(E38=0,0,((C38*1)+      @IF(E42=0,0,((C42*1)+      @IF(E46=0,0,((C46*1)+      @IF(E50=0,0,((C50*1)+      (1*D38)+(2*D39)+
                     (C39*2)+(C40*3)+(C41*4)/E38) (C43*2)+(C44*3)+(C45*4))/E42 (C47*2)+(C48*3)+(C49*4))/E46 (C51*2)+(C52*3)+(C53*4))/E50 (3*D40)+(4*D41)/C55
90 ---------------------------------------------------------------------------------------------------------------------------------
91                                              ESS        =                          @IF(E38=0,0,(C89-G89)^2*E38)+@IF(E42=0,0,(D89-G89)^2*E42))
                                                                                      +@IF(E46=0,0,(E89-G89)^2*E46)+@IF(E49=0,0,(F89-G89)^2*F89)
                                                TSS        =                          @IF(D38=0,0,(1-G89)^2*D38)+@IF(D39=0,0,(2-G89)^2*D39)
                                                                                      +@IF(D40=0,0,(1-G89)^2*D40)+@IF(D41=0,0,(2-G89)^2*D41)
93                                              Eta^2      =                                                              @IF(G92=0,@ERROR,G91/G92)
```

TABLE 7.3. GENERAL TEMPLATE FOR CROSSTABULATION ANALYSIS-Continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
94														
95		Look-up	Table: Chi Square Statistical Sig. Level											
96														
97	Where	df = 1	Where	df = 2	Where	df = 3	Where	df = 4	Where	df = 5	Where	df = 6	Where	df = 7
98	Comp X^2	Sig.	Comp X^2	Sig.	Comp X^2	Sig.	Comp X^2	Sig.	Comp X^2	Sig.	Comp X^2	Sig.	Comp X^2	Sig.
99														
100	0	1	0	1	0	1	0	1	0	1	0	1	0	1
101	.000628	.98	.0404	.98	.185	.98	.429	.98	.752	.98	1.134	.98	1.564	.98
102	.00393	.95	.103	.95	.352	.95	.711	.95	1.145	.95	1.635	.95	2.167	.95
103	.0158	.9	.211	.9	.584	.9	1.064	.9	1.61	.9	2.204	.9	2.833	.9
104	.0642	.8	.446	.8	1.005	.8	1.649	.8	2.343	.8	3.07	.8	3.822	.8
105	.148	.7	.713	.7	1.424	.7	2.195	.7	3	.7	3.828	.7	4.671	.7
106	.455	.5	1.386	.5	2.366	.5	3.357	.5	4.351	.5	5.348	.5	6.346	.5
107	1.074	.3	2.408	.3	3.665	.3	4.878	.3	6.064	.3	7.231	.3	8.383	.3
108	1.642	.2	3.219	.2	4.642	.2	5.989	.2	7.289	.2	8.558	.2	9.803	.2
109	2.706	.1	4.605	.1	6.251	.1	7.779	.1	9.236	.1	10.645	.1	12.017	.1
110	3.841	.05	5.991	.05	7.815	.05	9.488	.05	11.07	.05	12.592	.05	14.067	.05
111	5.412	.02	7.824	.02	9.837	.02	11.668	.02	13.388	.02	15.033	.02	16.622	.02
112	6.635	.01	9.21	.01	11.341	.01	13.277	.01	15.086	.01	16.812	.01	18.475	.01
113	10.827	.001	13.815	.001	16.268	.001	18.465	.001	20.517	.001	22.457	.001	24.322	.001
114														

115 Note: Remember to press ! thrice.

	O	P	Q	R
96				
97	Where	df = 8	Where	df = 9
98	Comp X^2	Sig.	Comp X^2	Sig.
99				
100	0	1	0	1
101	2.032	.98	2.532	.98
102	2.733	.95	3.325	.95
103	3.49	.9	4.168	.9
104	4.594	.8	5.38	.8
105	5.527	.7	6.393	.7
106	7.344	.5	8.343	.5
107	9.524	.3	10.656	.3
108	11.03	.2	12.242	.2
109	13.362	.1	14.684	.1
110	15.507	.05	16.919	.05
111	18.168	.02	19.679	.02
112	20	.01	21.666	.01
113	26.125	.001	27.877	.001
114				

NOTE: Columns do not align and additional rows are listed so that you may see the equations. In your template, follow row and column v
lines which do not have numbers.
When computing percents, use @IF and @ROUND functions, e.g., @IF(@OR(E38=0,@ISNA(C11)),0,@ROUND(C11/E38*100,1)).

with your earlier worksheet findings. Use your modified worksheet to check your master template. You may find it more useful to check your results with a slightly more complex table. I have, therefore, included the tabular values and summary statistics of the variables: (1) rank by sex and (2) rank by degree. See Table 7.4.

Okay, now that I've built the template, how can I use it and what do the results show? Well, for this data set, given the lack of statistical significance between female and male faculty on the reward structure (e.g., faculty rank), sex is a relatively unimportant predictor of salary differences. Different levels of degree, however, are strongly related to the variable of rank. Those holding the baccalaureate degree generally never made it past the rank of instructor. Those with no more than a master's degree were generally limited to the junior ranks of instructor and assistant professor. For this sample, only those holding the doctoral degree were rewarded with senior academic ranks. These differences were statistically reliable, and therefore likely to exist when examining the data from the several hundred faculty members at this college. Using this template for your data analysis needs will allow you to draw appropriate conclusions.

TABLE 7.4. WORKSHEET FOR CROSSTABULATION ANALYSIS

	A	B	C	D	E	F	G	H	I	J	K	L
1						Template for Contingency Table Analysis						
2	==========											
3						Data Entry Table						
4	----------											
5						Table 1.	RANK	by	SEX			
6	==========											
7			Attr. Female		Attr. Male		Attr. #3		Attr. #4		Total	
8	Var of Interest		----------		----------		----------		----------		----------	
9	Rank		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
10	----------											
11	Instructor		3	30	3	30	NA	0	NA	0	6	30
12	Assistant Professor		4	40	2	20	NA	0	NA	0	6	30
13	Associate Professor		2	20	3	30	NA	0	NA	0	5	25
14	Full Professor		1	10	2	20	NA	0	NA	0	3	15
15	Total		10	100	10	100	0	0	0	0	20	100
16	----------											
17	Chi^2 with	(3 df)	= 1.200000; sig. =		.8		NA					
18	Asymetric Lambda		with RANK				dependent	=	.0714286			
19	Gamma				=>		.2					
20	Pearsonian R	=	.1438390				R^2	=>	.0206897			
21		intercept=	1.800000				slope	=>	.3000000			
22	Eta	=	.1438390				Eta^2	=>	.0206897			
23												
24	==========											

	A	B	C	D	E	F	G	H	I	J	K	L
1						Template for Contingency Table Analysis						
2	==========											
3						Data Entry Table						
4	----------											
5						Table 1.	RANK	by	DEGREE			
6	==========											
7			Bachelor		Master's Degree		Doctoral Degree				Total	
8	Var of Interest		----------		----------		----------				----------	
9	Rank		Number	Percent	Number	Percent	Number	Percent			Number	Percent
10	----------											
11	Instructor		4	100	2	28.6	0	0			6	30
12	Assistant Professor		0	0	5	71.4	1	11.1			6	30
13	Associate Professor		0	0	0	0	5	55.6			5	25
14	Professor		0	0	0	0	3	33.3			3	15
15	Total		4	100	7	100	9	100			20	100
16	----------											
17	Chi^2 with	(	6) df =	25.29101; sig. =		.001		NA				
18	Asymetric Lambda		with RANK				dependent	=	.5714286			
19	Gamma				=>		1					
20	Pearsonian R	=	.8601103				R^2	=>	.7397897			
21		intercept=	-.382979				slope	=>	1.170213			
22	Eta	=	.8779776				Eta^2	=>	.7708447			
23												
24	==========											

NOTE: Unused cells which appear as @NA in the top table were /Blanked out in the bottom table.

One or two further words about using this template. First, you must make sure that you have entered the appropriate values in their appropriate cells. You need work only with columns A through C, E, G, and I. Careful checking of the completed table is recommended. Secondly, if you re-label each cell with its appropriate descriptive title and if you /Blank out unused cells, then you can print out this table and include it in any appropriate report. Finally, given the alignment of column and row cells in the data entry table and, given the computational structure, you must remember to press the ! key three times if you wish to see the correct results. All in all, that's not too tough.

Conclusion

With this article, we have explored another use of the chi square statistic and how to create a master template for computing essential equations with minimal effort. Minimal effort, however, is possible only after the master template is created.

Now that we know the basics of inferential statistics, next time we will explore how to test for statistical reliability of the regression equation and, therefore, the Pearson r statistic. We'll get a bonus and note how to use this set of equations to perform the rudiments of analysis of variance. See you then.

Loan Amortization

John Pinkerton

TODAY'S high interest rates are tearing the very bottom out of our wallets! Inflation is down, but interest rates are still well above the level most of us consider reasonable. In fact, the interest rate is now the biggest factor in deciding to buy or wait. If you bought a new car recently, you probably financed around $6,000 at about 12% interest for three years. The loan papers you received show that $1,174.24 is being charged for interest, but how much of each monthly payment actually pays off the loan? A printed list, called an amortization schedule, shows each loan payment, the portion of the payment applied to interest, and how much was applied to pay off the loan.

Lending institutions rarely give you an amortization schedule, so you have to make up your own. If you are in business for yourself, you need to know all the expenses incurred each month. It is therefore imperative that you have an amortization schedule so that you can total the amount of interest paid each month. In any case, the interest paid on loans may be tax deductible. If it is, you may have to wait until after the end of each year when the bank tells you how much of your payments went to pay interest. Waiting can delay getting the much awaited tax refund check. An amortization schedule can't save you any interest, but it can eliminate the delay.

"LOAN AMORTIZATION" may be used for all "simple" interest loans such as car loans and most home mortgages. Data entry is easy and self explanatory. However a word of caution is needed. Monthly payments will often include additional charges for reserves such as taxes and/or insurance payments. Be sure the amount entered for the monthly payment does not include these reserves. The monthly payment must be only the amount applied to principal and interest. The interest rate may be entered either as a whole number (e.g. 12%) or in decimal form. The program will do the rest. The results may be viewed on the screen or printed.

Sometimes the monthly payment is insufficient to completely pay off the loan in the term allowed. These loans will have a "balloon" payment at the end. For most loans, however, the last payment is somewhat less than the usual monthly payment because the tabulated payment is always a fraction of a cent too large, so the loan is paid off before the end of the loan term. If the monthly payment is too small to pay the interest, the program will tell you how much additional payment is necessary to start paying off the principal. The additional amount needed will cover the interest for the first month and apply one cent to the principle. Try some "what if" examples by changing the payment, term or rate.

"LOAN AMORTIZATION" will print on any size printer over 40 columns-wide. The program will ask you to enter the printer slot number and the width of the paper in columns. Output will be automatically formatted so the data columns are positioned properly.

The program consists of two subroutines and four data handling modules. Let's take a quick look at each and examine some of the programming involved.

The first subroutine beginning at line 50 is a short number formatting routine. Line 50 makes a string from the number being formatted and adds a decimal point and one zero if the number is an even dollar amount. Line 55 presents a really strange situation. It adds another zero if the amount (P) is an even dollar or an even ten cents such as $15.30. Simple enough if the line is used as shown. For some reason the Apple will frequently ignore this line if the intermediate variable R is not used. Try the line this way to see what happens:

```
55  IF P*10 = INT(P*10) THEN
      P$ = P$ + "0"
```

One guess is that the Apple will not properly evaluate arithmetic operations conducted on the left side of the equals sign when the math is part of a conditional statement. Just a guess. Line 60 adds blanks to the string to right justify the result.

The second subroutine beginning at line 75 prints the year end summary of interest paid. In this subroutine and throughout the program, the variable SLT is tested to see if output should go to screen or printer. SLT is zero by default and becomes one or more if the printer is selected for output. If SLT is zero, the descriptions are shortened and printed on screen by line 75. Line 80 sends the summary information to the printer. Output is positioned by POKEing memory location 36 with the tab value. This indirect method is needed because the Apple will not allow using the TAB( ) instruction beyond the screen width of 40 columns. You will see examples of this POKE in various places throughout the program. POKE 36,X also works on the screen as shown in line 335 and lines 415 through 425.

The program variables are initialized in the module beginning at line 100. The printer width is set at 40 columns and the date string DT$

```
LOAN AMORTIZATION
BY JOHN PINKERTON

CALL  -A.P.P.L.E.

10  GOTO 100
49  REM

FORMAT NUMBERS

50 P$ =  STR$ (P): IF P =  INT (P
     ) THEN P$ = P$ + ".0"
55 R =  FN R(P * 10): IF R =  INT
     (R) THEN P$ = P$ + "0"
60 P$ =  RIGHT$ ("          " + P$
     ,9): RETURN : REM RIGHT JUST
     IFY TO 9 SPACES
74  REM

PRINT YEAR END SUMMARY

75  PRINT " ":P =  FN R(YTD): GOSUB
     50: IF SLT = 0 THEN  PRINT Y
     R;" INT $"; RIGHT$ (P$,8);:P
      =  FN R(LTD): GOSUB 50: PRINT
      TAB( 21);"TOTAL INT $"; RIGHT$
     (P$,8)
80  IF SLT THEN  PRINT YR;" INTER
     EST $";P$;: POKE 36,PW / 2:P
      =  FN R(LTD): GOSUB 50: PRINT
     "GRAND TOTAL INTEREST TO DAT
     E $";P$
85  PRINT " ":YTD = 0: RETURN
99  REM

SET UP VARIABLES

100  TEXT :PW = 40:DT$ = "JANFEBM
     ARAPRMAYJUNJULAUGSEPOCTNOVDE
     C"
105  DEF  FN R(P) =  INT (100 * P
      + .5) / 100: REM FNR IS FOR
      ROUNDING TO 2 PLACES
110  TEXT : HOME : PRINT  TAB( 10
     )"AMORTIZATION SCHEDULE"
115  VTAB 3: INPUT "ENTER LOAN TI
     TLE: ";TITLE$
120  VTAB 5: INPUT "LOAN AMOUNT?
     ";BAL: IF BAL < 0 THEN 120
125  VTAB 7: INPUT "ANNUAL LOAN I
     NTEREST RATE (APR)? ";APR: IF
     APR > 1 THEN APR = APR / 100

130  VTAB 9: INPUT "LOAN TERM IN
     MONTHS? ";TRM: IF TRM < 1 THEN
     130
135  VTAB 11: INPUT "MONTHLY PAYM
     ENT? ";PMT: IF PMT < 0 THEN
     135
140  VTAB 13: INPUT "BEGINNING MO
     NTH & YEAR (MM/YR)? ";A$:MM =
      VAL ( LEFT$ (A$,2)):YR = 19
     00 +  VAL ( RIGHT$ (A$,2))
145  IF MM < 1 OR MM > 12 THEN 14
     0
150  VTAB 15: INPUT "OUTPUT TO PR
     INTER OR SCREEN? (P/S) ";P$:
      IF P$ <  > "P" AND P$ <  >
     "S" THEN 150
155  IF P$ = "P" THEN  VTAB 17: INPUT
     "ENTER PRINTER SLOT NO. ";SL
     T: VTAB 19: INPUT "ENTER PAP
     ER WIDTH IN COLUMNS: ";PW
160  IF SLT THEN  IF SLT < 1 OR S
     LT > 7 OR PW < 80 OR PW > 13
     2 THEN 155
165  VTAB 21: INPUT "ARE YOUR ENT
     RIES CORRECT? (Y/N) ";A$: IF
     A$ <  > "Y" THEN 100
199  REM

TAB SETTINGS & PMT CHECK

200 T1 = PW / 4 - 3:T2 = PW / 2 -
     5:T3 = PW * 3 / 4 - 5:T4 = P
     W - 10:T5 = PW / 2: IF SLT =
     0 THEN T1 = 4:T2 = 13:T3 = 2
     2:T4 = 30:T5 = 12
205 CHG =  FN R(APR / 12 * BAL): IF
     CHG < PMT THEN 300: REM PAYM
     ENT ADEQUATE?
210 P =  FN R(CHG - PMT + .01): GOSUB
     50: VTAB (13): CALL  - 958: PRINT
      CHR$ (7);"THE PAYMENT IS $"
     ;P$;" SHORT OF"
215  PRINT : PRINT "ENOUGH TO STA
     RT PAYING OFF THE LOAN.": PRINT

220  PRINT "CHECK YOUR ENTRIES AN
     D START OVER.": PRINT : PRINT
     "PRESS ANY KEY WHEN READY.":
     : GET A$: RUN
299  REM

PRINT THE HEADING

300  IF SLT = 0 THEN  HOME : REM
     CLR SCRN IF NOT USING PRINTE
     R
305  IF SLT THEN  PRINT  CHR$ (4)
     "PR#";SLT: PRINT  CHR$ (9);P
     W;"N": REM  CHR$(4) IS CTRL
     D, CHR$(9) IS CTRL I
310  POKE 36,PW / 2 -  LEN (TITLE
     $) / 2: PRINT TITLE$: PRINT
     " "
315 P = BAL: GOSUB 50: IF SLT = 0
      THEN  PRINT "PRINC.  $ ";P$
     ; TAB( 21)"INT. RATE IS ";AP
     R * 100;"%": REM SCREEN
320  IF SLT THEN  PRINT "PRINCIPA
     L AMOUNT $ ";P$;: POKE 36,PW
      / 2: PRINT "INTEREST RATE (
     APR) IS ";APR * 100;"%": REM
     PRINTER
325 P = PMT: GOSUB 50: IF SLT THEN
      PRINT "MONTHLY PAYMENT  $ "
     ;P$;: POKE 36,PW / 2: PRINT
     "TERM IS ";TRM;" MONTHS"
330  IF SLT = 0 THEN  PRINT "PAYM
     ENT $ ";P$; TAB( 21);"TERM I
     S ";TRM;" MONTHS"
335  PRINT " ": POKE 36,T5: PRINT
     "-- APPLIED TO --";: POKE 36
     ,T4 + 2: PRINT "LOAN"
340  IF SLT = 0 THEN  PRINT "MO.
     PAYMENT INTEREST    PRINC
     BALANCE"
```

```
345  IF SLT THEN  PRINT "MONTH";:
      POKE 36,T1: PRINT "PAYMENT"
     ;: POKE 36,T2 - 1: PRINT "IN
     TEREST";: POKE 36,T3 - 2: PRINT
     "PRINCIPAL";: POKE 36,T4 + 2
     : PRINT "BALANCE"
399  REM

PRINT THE DATA LINES
400  FOR I = 1 TO TRM:CHG =  FN R
     (APR / 12 * BAL): REM CALC I
     NTEREST
405  IF PMT > BAL THEN PMT = BAL +
     CHG: REM LAST PAYMENT
410  PRINT I;: IF SLT THEN  POKE
     36,4: PRINT  MID$ (DT$,MM *
     3 - 2,3);" ";YR;: REM PRINT
     MONTH AND YEAR, PRINTER ONLY

415  POKE 36,T1:P = PMT: GOSUB 50
     : PRINT  RIGHT$ (P$,7);: POKE
     36,T2:P = CHG: GOSUB 50: PRINT
      RIGHT$ (P$,7);: REM PRINT P
     AYMENT & CHARGE
420  POKE 36,T3:P =  FN R(PMT - C
     HG): GOSUB 50: PRINT  RIGHT$
     (P$,7);: REM PRINT PAYMENT T
     O PRINCIPAL
425 BAL =  FN R(BAL - P): POKE 36
     ,T4:P = BAL: GOSUB 50: PRINT
     P$: REM PRINT NEW BALANCE
430 YTD = YTD + CHG:LTD = LTD + C
     HG: IF MM = 12 AND BAL > 0 THEN
      GOSUB 75: REM PRINT TOTAL L
     INE
435  IF SLT = 0 AND MM = 12 AND B
     AL > 0 THEN  PRINT "PRESS AN
     Y KEY TO CONTINUE ";: GET A$
     : PRINT : VTAB 8: CALL  - 95
     8: VTAB 8
440 MM = MM + 1: IF MM = 13 THEN
     MM = 1:YR = YR + 1
445  IF BAL = 0 THEN 455: REM DON
     E - EARLY PAYOFF
450  NEXT I
455  GOSUB 75: IF SLT THEN  PRINT
      CHR$ (4);"PR#0": REM PRINT
     TOTAL LINE & TURN OFF PRINTE
     R
460  PRINT : INPUT "WANT TO RUN A
     NOTHER (Y/N) ";A$: IF A$ = "
     Y" THEN  RUN
```

defined in line 100. Line 105 sets up a defined function for rounding numbers to two decimal places. The loan information data is obtained by a group of input lines beginning at line 110. Line 125 converts the interest rate to a decimal if it was entered in whole numbers. Line 140 takes the loan date string A$ and breaks it into the month and year components. The starting month variable MM is set by taking the value of the first two characters in A$. The year variable YR is set in a similar way using the last two characters and adding 1900. Using the LEFT$ and RIGHT$ instructions makes it unnecessary to check the format of A$ because the characters (if any) between the first two and the last two are not used.

Output tab settings are calculated in line 200. The tab settings are proportions of the printer width variable PW. Interest (CHG) for the first month is calculated in line 205 and compared to the monthly payment (PMT.) If the payment is inadequate to cover principal and interest, the program calculates the additional amount needed, rings the bell and prints the screen message. The RUN instruction is issued at the end of line 220 to restart the program. RUN is used because it cancels the carriage return normally required after the GET in this line, resets all variables, and makes the usual GOTO statement unnecessary.

Report headings are printed in the module beginning with line 300. If the printer is being used for output, the printer card is turned on by line 305. The remainder of the module is easily followed. Keep in mind that POKE 36,X is the same as using TAB(X) and that if SLT = 0 output will go to the screen.

Loan calculations and results are handled in the final module beginning at line 400. A loop is used to count each month of the loan. Interest (CHG) is calculated for each month in line 400. Line 405 checks the balance (BAL) to see if the payment (PMT) is more than required to pay off the loan and interest. If the payment is too big, it is adjusted to equal the amount required. If the printer is being used, the month and year of each payment is printed by line 410. Line 410 uses the MID$ function to locate the portion of DT$ to be printed. The starting place for MID$ is determined by offsetting three places for each month less two. Line 430 adds the monthly interest charge to the year to date interest (YTD) and to the loan to date interest (LTD) totals. If the month (MM) is 12 (December), this line also calls the subroutine at line 75 to print the interest summary.

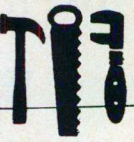
Output to the screen is temporarily stopped after each year by the instructions in line 435. The PRINT instruction following GET A$ provides a carriage return and does not affect the screen display. If the PRINT is left out, the next data printed will not appear. Line 440 adds one to the month counter (MM.) It also resets the month and increments the year counter if necessary. Line 445 checks for an early loan payoff. Line 455 prints the final interest summary and turns off the printer card if it was in use. The RUN command is used again in line 460 if another amortization schedule is needed, otherwise the program simply runs out of instructions and ends.

By the way, if you have wondered how the blank lines are inserted in a REM statement, just add a [Ctrl-J] after REM and at the end of the remark. [Ctrl-J] issues a line feed and a blank line will be printed with each [Ctrl-J].

May all your loans be low interest and paid off early!

Save the Toolkit

A Call to Arms



Recent reports suggest that export restrictions have been placed on Apple's 32-bit computer technology by the U.S. government. What is Apple doing to foster software development for this valuable national resource?

Dave Redhed

MOST OF YOU who have read this far are to be congratulated because, even if you haven't the faintest idea what "The Toolkit" is, you are willing to respond to a call for help. I hope to be able to motivate you to even further involvement in this noble task. To those who know precisely what I am talking about, what I have to say can only add fuel to your burning desire.

The Toolkit is the development tool for applications intended to be fully integrated into the Lisa Office System. For me, the Toolkit represents a milestone in the technology of software development — a milestone which may drop out of sight if some steps are not taken to prevent it. Most of my 23 years in computing have been occupied with large computers and supercomputers on which many, many software development tools have been created and used. Until very recently, microcomputers have had size constraints which make some of the more elaborate, existing development tools impractical for transfering from the larger computers. However, currently available memory capacities and cpu speeds for micros make some different approaches possible. The people at Apple Computer (the prime mover in the Toolkit being Larry Tesler) have taken the opportunity to do something really new, but now its continuance is threatened.

The first releasable version of the Toolkit will be completed in June 1984, but Apple Computer has decided to drop support for the Toolkit without ever making it a formal product. Numerous developers have been developing software with pre-release versions of the Toolkit since 1983. In May 1984 developers were informed that what was to be the formal product release will only be completed informally and given to those developers who have already been working with it (and presumably to any other developers who request it). The catch is that there will be no support from Apple Computer — if you get it, you are on your own.

While I have no intention of criticizing Apple for their business decisions, I do feel that their action will result in the demise of the Toolkit if somebody does not do something about it. If there are more of you out there who feel as I do and want to do something, contact me soon. Although our numbers may be small, I am confident we can make an impact.

For those who have used or seen Lisa applications in the Office System, you know that the operating environment is very sophisticated and it has the highly desired quality of uniformity of user interface across a broad set of applications. Think of yourself as a developer who wants to bring a new application into this environment and try to visualize what it means to replicate all those user interface functions in your application. The typical approach is for the supplier of the basic system (Apple Computer) to help out by making available one or more libraries of routines which provide you with all the individual functions. This means that you do not have to re-write all that graphics and other support software; you just have to call the appropriate function at the appropriate time.

For some aspects of an application this can work satisfactorily, but it is not highly effective for the user interface of an application. The reason is that the user interface is not a separable portion of an application, but is distributed widely throughout the code and its logic can be heavily intertwined with the application's logic. I believe that this is the major reason why a highly uniform user interface across numerous applications has been so hard to achieve (and is so rare).

Those who designed the Toolkit obviously understood this problem, and they have taken a fresh look at a solution. They have reversed the traditional program structure and have concluded that the user interface as a system should be the basic control function and applications will, in effect, run under the control of the user interface. Figures 1 and 2 attempt to illustrate this difference.

When the application receives control from the user interface, it should be only to do application specific tasks, not those things which are common to all applications. As an example, scrolling of document contents through the window should never have to occupy the attention of an application. If the application were to do this, the code would have to be structured so that at any instant the user could be free to scroll (not to indicate that he would like to scroll, but to actually do the scrolling). Traditional application program structure will just not allow that to happen in any practical way. This is what gives rise to "modes" which severely bound the user's freedom at any point in time.

Object-oriented Programming

The first "innovation" from Apple is not really an innovation, but a new implementation of an existing idea. They have created a version of Pascal that has been extended to include object-oriented structures which were seen several years before Lisa in the Smalltalk language

Traditional Application Program Structure

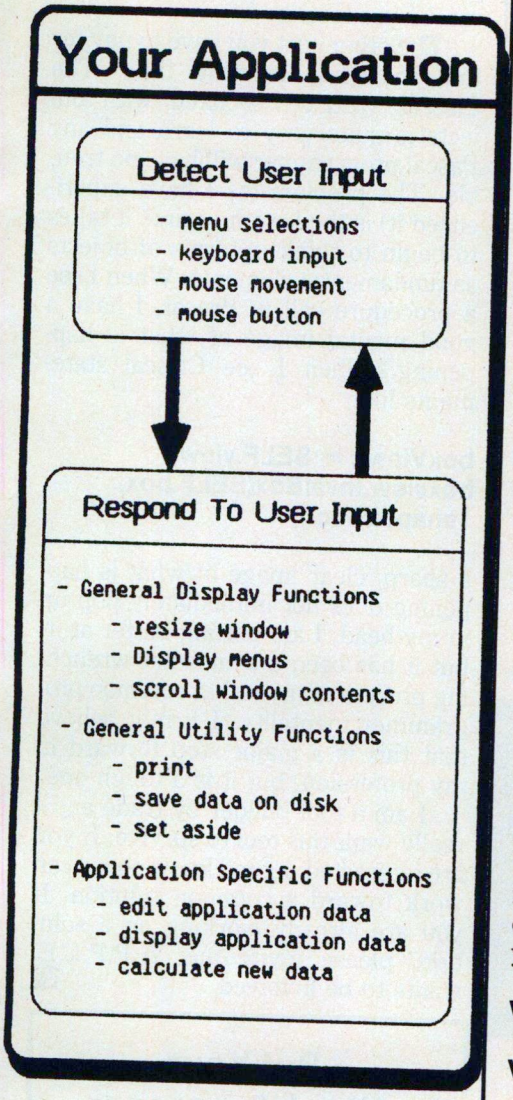


Figure 1

developed at Xerox. This new version of Pascal is called Clascal and it contains an extended version of UCSD Pascal as a subset. I am not in a position to defend why they modified Pascal instead of using Smalltalk; the primary justification is that the resulting syntax is better and easier to learn. If you wish to pursue object-oriented programming in some depth, a good reference is the August 1981 Byte Magazine. It contained a total of 13 articles on Smalltalk and object-oriented language subjects, and the article by Larry Tessler is especially pertinent to the Toolkit concepts.

What did object-oriented programming bring to the software development environment I described earlier? It gives us the ability to combine existing user interface software with new applications without (1) having to explicitly call all the user interface routines from supplied object libraries, or (2) having to include the user interface code in my application program (thus requiring access to the user interface source code). The fancy word for this is extensibility of software; i.e. I can extend the user interface software (supplied in object form from Apple) with my application without having to formally relate the two entities together at the source code level. This means that my application will automatically have all the established attributes of the user interface without my having to re-create them as part of my application. In addition, the user's view of the system will be that my application and the user interface are part of an integrated whole.

The User Interface Environment

Clascal was step one in the creation of the Toolkit. Step two is the creation of a user interface environment which is general enough to include a broad set of applications. Below is a small sampling of the Toolkit functions which may help you appreciate the kinds of things to which your application will be an extension.

Window management—displaying, resizing, and moving windows
View management—displaying document contents in one or more ways; e.g. numerical and graphical views of data in LisaGraph
Panel management—scrolling document contents, creating multiple panels for viewing
Selection processing—keeping track of what object or objects on the screen are selected
Command processing—pull-down menus, menu item selections, and undo
Printer processing—transforming screen images to printer images
Dialog processing—presentation of special information to users via dialog boxes
Mouse processing—responds to pressing the mouse, moving the mouse and releasing the mouse

Application Program Structure Under the Toolkit

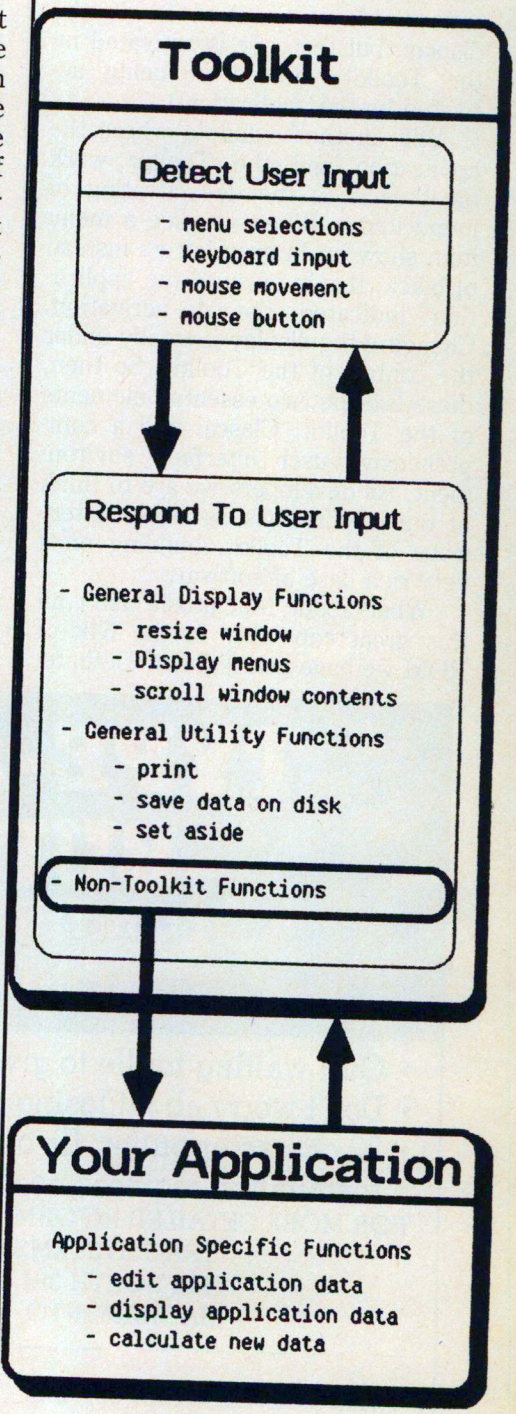


Figure 2

In one extreme, scrolling of information in a window takes place without the application ever having to respond to a request to scroll. If it is of interest to the application to know scrolling has or is taking place, it can be detected; but normally it is of no

concern. In the other extreme, creating items in the window is totally the responsibility of the application. Once created, however, the items can be re-displayed under control of the Toolkit without direct involvement of the application. (Obviously the application code is required to do the display, but the code is activated by the Toolkit, instead of being activated by the application.)

Still another example where the application and the Toolkit work together is in the de-activating of menu items. When you see a menu item show up in gray letters instead of black, this is because the application indicated the de-activation. Changing the display is totally under the control of the Toolkit. So then, these are the two essential elements of the Toolkit: Clascal and a comprehensive user interface environment. As developers we are to think of our applications as being extensions of the Toolkit, building on a very rich base of software.

What about Macintosh? Isn't all this great capability in the 64k of ROM we have heard about? Definitely not! What the ROM contains for the user interface is a collection of very useful functions which make the window management and desktop type activities easy to implement. This means that you do not have to go all the way down to fundamental QuickDraw calls to get the nice visual effects on the screen. But this is still the traditional relationship shown in the diagram of Figure 1. Each application contains the primary control loop and each application is responsible to organize the user interface logic at a much lower level of interaction than is associated with the Toolkit.

On the Other Hand

The Toolkit sounds so good; are there no negatives? Certainly! When did you last get something for nothing in the world of computers? There are two main problems associated with this approach; one is with computer resources and the other is educational. The Lisa is a one megabyte system and for good reason. All these wonderful user interface facilities take space, a lot of it. While I cannot force anyone to agree that the excellent qualities of the Lisa user interface are worth the cost, I have long ago settled that issue in my mind. I believe that it takes a lot of resources and software to make computers into devices on which people can be productive.

The other cost you have to pay for the Toolkit is learning time. The Clascal syntax associated with objects is quite easy to learn and any Pascal programmer will have no trouble. The problem (as I have experienced it) is the length of time it takes to begin to think in terms of objects as fundamental elements. When I see a procedure call in Pascal, I have a good mental image of what is happening. When I see Clascal statements like,

```
boxView := SELF.view;
boxview.InvalBox(SELF.box.
  shapeLRect);
```

a sharp, clear image of what is happening does not immediately pop up in my head. I am getting better at it, but it has been a somewhat wrenching process to my rather common programmer mentality. I firmly believe that this is a major step forward in my profession, but it is a tough one.

I am a tool builder by trade and I really want this tool to survive. If you are interested, let me know so we can work toward a common solution. If you are already working on a solution, please invite me. A.P.P.L.E. wants to be involved.

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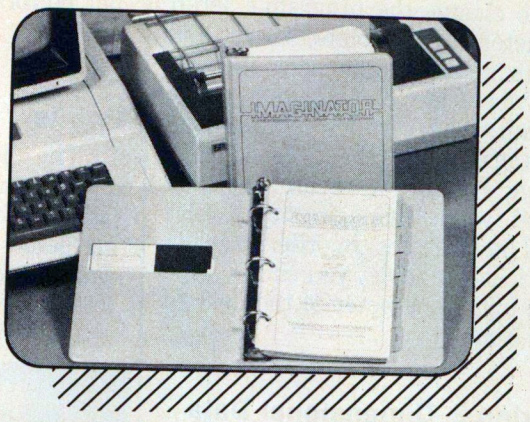
Review

IMAGINATOR

A 3D Graphics Package



William R. Miller

THE SUBJECT of three-dimensional computer graphics, considered "hot" in the world of minis and mainframes, has been perceived as a relatively "cool" topic in the realm of microcomputers. This is due in part to the inherent limitations of most 8-bit processors, and in part to the lack of any serious attention to the subject from software developers. 3D graphics programs are still considered "utilities" by most people in our industry.

IMAGINATOR is a relatively powerful, professional-quality 3D graphics program designed to run on Apple II series computers. You do not have to be a programmer to use IMAGINATOR. Anyone interested in computer graphics can readily create, edit, manipulate and display 3D graphic images with IMAGINATOR's powerful input and display commands. Images can be displayed on Apple's high-res screen, dumped to a printer, or saved to disk as binary picture files.

Most the 3D graphics programs currently available for the Apple were written to satisfy the need of gamers, home programmers and casual hobbyists. As such, they lack the features and performance characteristics desired by the more serious user. The IMAGINATOR program, which was written to meet the needs of the professional user, represents a step forward in the category of 3D graphics for the Apple.

Documentation

Probably one of the most attractive aspects of IMAGINATOR is that it is easy to use. In fact, what's ironic is that IMAGINATOR, which is far easier to use than virtually any other 3D graphics programs available for the Apple, has the most complete manual. The manual's 180 pages, with over 50 illustrations and screen images, are bound into an attractive three-ring binder which is tabbed into the following sections: Introduction; Tutorial; Commands; Appendices; Glossary; and Index.

PRODUCT:	IMAGINATOR
USE:	3D graphics generator
FOR:	Apple II, II+, IIe
COMPANY:	Shelter Research Institute, Inc. P.O. Box 1200 Port Townsend, WA 98368
INCLUDES:	Software disk Manual
PRICE:	$129

The Introduction outlines IMAGINATOR's general capabilities and introduces the new user to some of the protocols and procedures pertaining to the operation of the Apple. The well-written Tutorial section of the manual teaches the user how to use the various features of IMAGINATOR. The Command section gives the user an introduction to the overall structure of the program and provides a complete description of each command. The Appendices discuss various technical subjects and describe how to configure IMAGINATOR for the user's particular system. The technical subjects covered in the Appendices include an Introduction to 3D Graphics, a list of all Sample Data referenced in the manual, a discussion of Printer Interface Cards, a list of Compatible Programs, a definition of Error Messages, and a description of the Data File Formats used for storing points and lines. The manual is thoroughly indexed.

Setting Up

To use IMAGINATOR, simply boot the program diskette and wait momentarily while the program configures itself for your system. The program will automatically determine which variety of Apple is hosting its capabilities and how much memory is available (48K or 64K). The program will configure itself for a one drive system with a graphics printer connected to the computer via a parallel graphics interface card. If these assumptions do not match your system, then the setup parameters can be redefined with the program's Configuration module.

Once the boot process is completed the Main Menu (Figure 1) appears on the screen, providing access to the various program modules which have been set up for editing, manipulating and displaying three-dimensional data. The Configuration module, as mentioned above, can be

Figure 1

```
***        IMAGINATOR MAIN MENU        ***

YOUR SELECTION IS

   CONFIGURE SYSTEM

   POINTS
   LINES
   OBJECTS

   QUIT PROGRAM

WHICH ONE?
```

used to change the program's setup parameters. The Points, Lines, and Objects modules represent the primary operating components of the program. The Utilities module provides the user with the various housekeeping routines that are typically desired when managing data files stored on diskettes. In order to select a particular module, you simply type in the initial character of the desired menu item.

Entering 3-Dimensional Data

Most micro-based 3D graphics programs, including IMAGINATOR, define objects as a set of points and lines in space. The points are defined by their three dimensional coordinates relative to a chosen origin, and lines are defined by their end points. The objects are transparent (since planes are not defined), and are thus sometimes called "wire frame diagrams." Hidden lines are not removed.

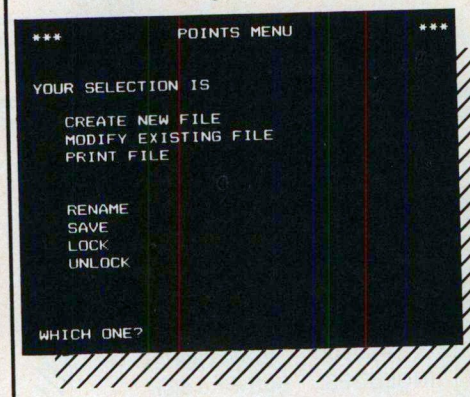
Naive users often would like to be able to "draw" in their data using a light pen or a graphic digitizer. These two devices work well for encoding two dimensional data but present a number of difficulties when trying to encode three-dimensional data. Generally speaking, these devices allow the user to "draw" in two of the three coordinates required for describing a point (or line) in three-dimensional space. They do not allow the user to "draw" in the third coordinate, at least not directly. To input the third coordinate, the user must either rotate the drawing 90 degrees and then "draw" in the third coordinate, somehow relating it to the first two coordinates, or else type it in from the keyboard. This process is often more difficult and time consuming than simply typing in all three coordinates directly from the keyboard, particularly if the program has a good input editor. One advantage of keyboard entry, which is often overlooked, is the fact that exact coordinate values can be entered. This is difficult to do, if not impossible, using an analog input device such as a light pen or a digitizer.

IMAGINATOR avoids the hassle of trying to "draw" in three-dimensional data using a two-dimensional device by providing the user with two extremely powerful keyboard input editors: one for Points and one for Lines.

Points

The Points Menu (Figure 2) allows you either to Create a new points data file or to Modify an existing points data file. Points and lines data are entered into the computer

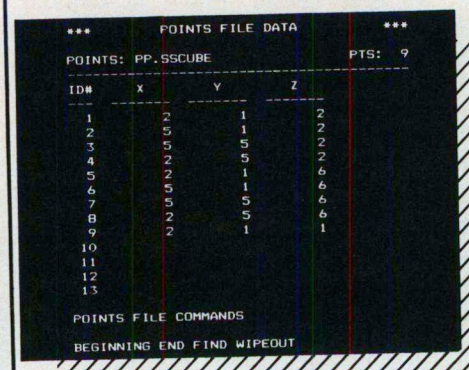
Figure 2



via a table using a technique similar to most spreadsheet programs. The user simply moves the cursor to the location in the table where the data is to be entered (or edited) and then types in the desired value.

The Points Editor (Figure 3) enables the user to input all point data

Figure 3



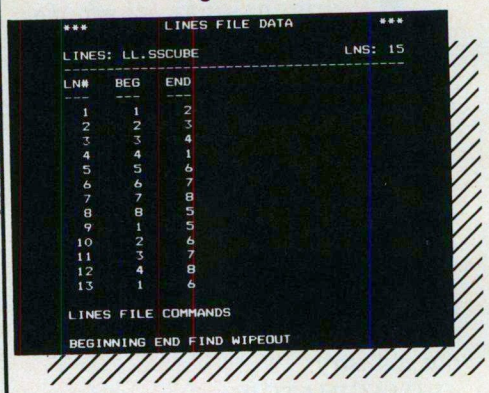
(in the form of XYZ coordinates) directly from the keyboard. When entering XYZ values for a particular point the program assumes the default values for X, Y, and Z to be equal to the corresponding XYZ values of the previous point. The user need only enter the values for X, Y and Z that are different from the corresponding values of the previous point. Imaginator will fill in the other values automatically

One nice feature in the Points Editor is its Find function, which allows the user to find any XYZ value within a specified range of points and selectively replace it with a new value. This allows the user to move planes in space, thus modifying the form of the object.

Lines

With the Lines Editor (Figure 4) you simply specify 10 numbers of the beginning and ending points for each line. Unless told otherwise, IMAGINATOR will assume that the default value for the beginning point of a line

Figure 4



is equal to the ending point of the previous line. The program also assumes that the ending point ID number of the current line is equal to the next ID number in sequence. Thus, when entering a series of lines that have been numbered in sequence, the user need only input the ID number specifying the starting point of the first line, then press [Return] for each of the following entries.

Viewing Objects

In order to define an object the user simply specifies both the point data file and the line data file to be used. IMAGINATOR then combines the two files to create the object. This provides the ability to generate different objects from a common set of points.

When an object is first created, IMAGINATOR automatically positions it in the middle of Apple's high-res screen. Once this is done, the user may view the object from any point around *or within* the object. Yes, that's right. Since IMAGINATOR supports true line clipping at all window edges and at the picture

Figure 5

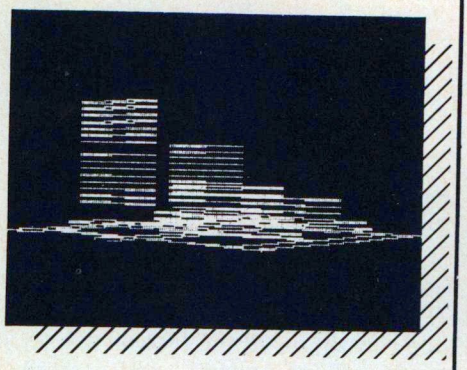


Figure 6

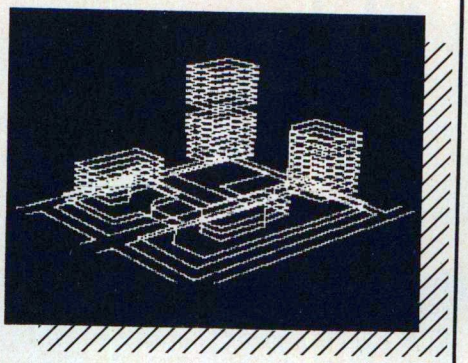
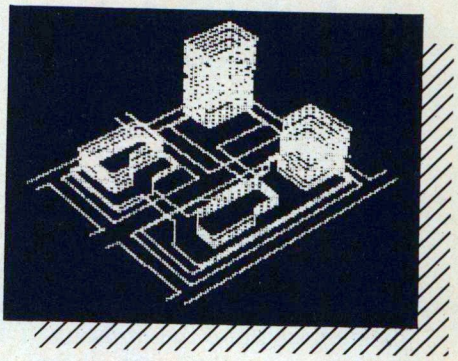


Figure 7



plane, you can actually locate the eye inside the object. Some of the available 3D graphics programs which do not support true line clipping simply eliminate the line if it intersects a window boundary or the picture plane. This is done to save calculation time and increase speed. In this case the images are drawn faster but are not always correct. The developers of IMAGINATOR have elected to sacrifice a little speed for accuracy, something I think most professional users will appreciate.

Shifting Viewpoints

Once the initial view of the object has been drawn, additional views may be generated by specifying any of the following parameters: location of the eye point, location of the view point, type of projection (perspective or orthographic), and distance from the eye point to the picture plane (focal length).

Views may also be modified by requesting an incremental change in view using any one of IMAGINATOR's interactive display commands: Up, Down, Left, Right, Forward, Back, Turn Clockwise, and Turn Counterclockwise. These commands, which are each activated with a single key stroke, can be entered as orbital commands (allowing the user to fly around the object while looking at a fixed view point), as panning commands (allowing the user to fly by the object while maintaining a fixed direction, but not position, to the line of sight), or as aiming commands (allowing the user to look around from a fixed eye point). One nice feature is that the increment of movement for each of these commands can be set by the user. Figures 5, 6, and 7 show some examples of IMAGINATOR's graphics output.

The Viewspec command in combination with the interactive eye movement commands (Orbit, Pan and Aim) give the user total control over the process of viewing an object in space. These commands are delightfully easy to use and represent one of the most powerful features of the program. The user can abort the drawing process by simply pressing the Escape key and then immediately go on from there by selecting a new view. Next time around, however, I would like to see a macro command that would allow the user to store a set of eye movement commands so they could be implemented in one step with a single key stroke.

Saving Pictures

Once a view has been drawn on Apple's high-res screen, the user has the option of dumping the screen image to a graphics printer or saving it on a data diskette as a standard binary picture file. IMAGINATOR assumes the user's printer is connected with one of the more popular graphics parallel interface cards. If so, the screen image can be dumped to the printer with a single keystroke. If the user does not have one of these graphics interface cards, the screen image can be saved on diskette as a binary picture file and then printed with one of the currently available screen dump utilities.

The picture data file can also be saved to disk as a points data file and as a lines data file, which are saved as standard text files. One of the appendices in the manual clearly defines the format of these files so you can use the data in your own program.

Availability

IMAGINATOR can be purchased through A.P.P.L.E. for $60.00 (that's less than half the retail price). Not only is the program in unprotected form, but a fully commented listing can also be obtained for $30.00 (and that's a steal).

Given IMAGINATOR's relatively few shortcomings, I would say it's an excellent program. Given the fact that it's sold in a completely open format, IMAGINATOR is indeed a "best buy."

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ALF Music Card MC1

(Continued from page 17)

use it. There are two audio outputs which should be connected to your stereo. Three of the voices are assigned to the left channel, three to the right channel, and the other three to both.

Using the Software

In most programs written for playing music, the music is entered as a series of data statements or a set of data entered into the program. The ALF ENTRY program is more than that. If you have ever read sheet music you can easily pick up the ENTRY program. As allow me to enter the REST that I wanted. Except for this minor flaw, I preferred using the KoalaPad over paddles or joystick. What I would like to see is an option to use the new AppleMouse for music entry. A special version of the ENTRY program has been developed by the Veterans Administration in Atlanta for disabled persons using the keyboard for input.

The PLAY program will play songs created by the ENTRY program. Songs may be loaded and played one at a time, or an EXEC file called ALBUM can be created with a program called DISCO to play a disk full of songs one after another. The program called HUSTLE will create an ALBUM file containing all the files on a disk. These programs are all well documented and easy to use. As the song is played, a lo-res color display is

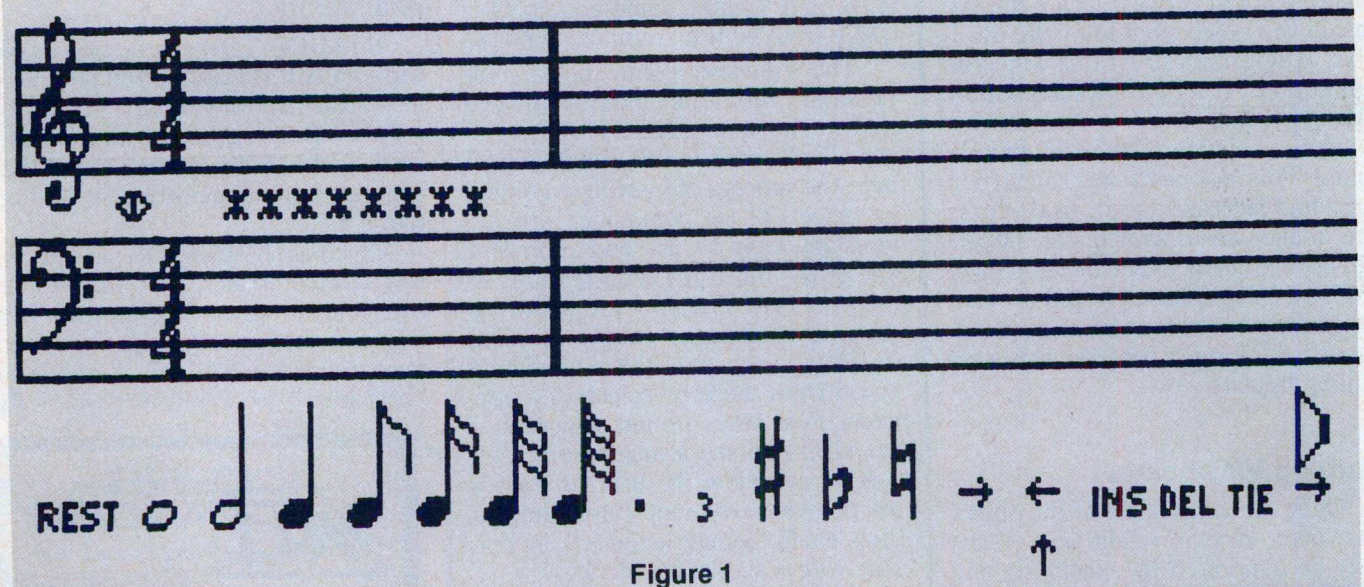

Figure 1

Figure 1 shows, the time, key signature, part number (0–8 voices), tempo, and envelope shaping functions are represented on the screen and can be entered from the keyboard. All of the envelope functions used in the ENVELOPE program are supported. Subroutines can be created and CALLed to repeat selected parts of the song. Subroutines may also CALL other subroutines. Some example songs come with the software to illustrate techniques of using subroutines and envelope shaping. Paddle 0, the "menu paddle," controls the selection of note values and other menu selections. Paddle 1 is the "note paddle." With paddle 1 you can select the pitch of the note to be entered. There is also a version of the entry program for the Apple *II*e which uses the arrow keys instead of the paddles. I personally prefer using the arrow keys, except that it takes more time to move the pointers than with the paddles. Of course you have to have a good pair of paddles to use the paddle version of the ENTRY program. As my paddles wear or get dirty, the pointer seems to jump around and makes it difficult to enter music quickly. Part of the problem is that the program uses only the lower half (about 0–150) of the paddle range (0–255). I tried the program with the KoalaPad but found it hard to reach the low end of the range of each paddle (paddle 0 points to REST). However, by entering an illegal command at the keyboard, the arrow pointer (paddle 0) would point to REST and shown on the screen to give you something to watch while listening to the song.

To play songs in your own programs, a program called PERFORM is included. The PERFORM routine is called from your program after initializing the card and loading the song data from disk. A short program must be typed in from the book to convert the song to be PERFORMed to a binary format so it will work with the PERFORM program. Any graphics or special touches should be done prior to calling PERFORM because that routine has control until the entire song is played. Songs could be broken in parts to do other things with the calling program in between the notes. If the lo-res display (same as used in the PLAY program) is desired, another routine called FLASH could be called in place of the PERFORM routine, and the lo-res graphics display will appear on the screen as the song plays.

Recommendations

There are many applications for use of this card — most of which can be implemented without extensive programming. I use my card just for my own musical enjoyment, but some people have even used the card as a substitute for a church organ. One day I would like to use my Apple to control a Christmas display and use the MC1 to play carols in the background. For the user who

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121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150

SURVEY

What one computer do you currently use most?

A ☐ *Apple II*
B ☐ *None*
C ☐ *Apple IIe*
D ☐ *Other (specify)*

What hardware product are you most likely to buy in the next 4 months?

E ☐ *Hard Disk*
F ☐ *5 megabyte*
G ☐ *10 megabyte*
H ☐ *20 megabyte*
I ☐ *8086 board for your Apple (run IBM P/C software)*
J ☐ *Apple keyboard (increase capability)*

What computer (if any) would you likely purchase in the near future?

K ☐ *Apple IIe*
L ☐ *Lisa*
M ☐ *MacIntosh*
N ☐ *Apple III*
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wants to do other things with the card, information on "bare hand" programming of the card and the structure of the song data is well documented in the manual.

The program disk supplied with the card can be copied to create a back-up disk. Preprogrammed software is also available. One minor drawback is that sheet music cannot be dumped to a printer, however the song data can be listed on a printer using the program MLIST supplied on the disk. This utility gives you a hard copy backup of the song data.

Of all the boards being produced which are similar to the MC1, the ALF Products MC1 card was one of the first and is still one of the best.

The MC1 card is available from ALF Products Inc., 1315F Nelson St., Denver, Co. 80215 (303) 234-0871 for $169.00.

Educational Software

(Continued from page 34)

probe costs points, and correct trackers get points (more points for more complicated equations).

"Equation Plotter" allows you to enter equations and set coordinate grid boundaries. It would be useful for classroom demonstrations.

"Interpreting Graphs," the second package in the demo includes two samples. "Escape" is a game where a "robber" tries to escape through a grid street system (so students have to know the X-Y coordinate system). The student cannot see the robber, only some information about him as it is plotted on a graph at the top of the screen. He can choose to see a graph of: the direction headed, the distance north of Main St., or the angle with East Main St. This can be tricky! A student then tries to erect barriers in the grid to block and catch the robber. If successful, a plot of the robber's path is shown.

"Relating Graphs to Events" provides a series of practical problems. First, three graphs are plotted (on same axes) with the two axes labeled. The student is then presented with a practical situation and asked which graph is appropriate. If the wrong one is selected, a hint is given. When the correct one is selected, the others are erased. On the demo, the practical problems were: water draining from a bath tub (depth vs time), a sand castle being washed by waves (height vs time), and a wagon rolling down a hill into a tree (speed vs time).

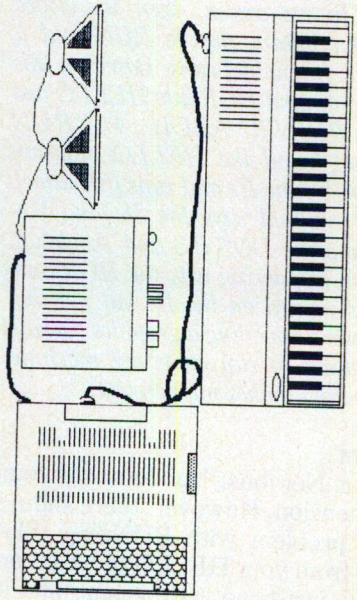
Conclusion? I like this approach to letting potential customers see the software before purchase (although I would prefer to see the *real thing!*). The cost is reasonable and it appears to give a good overview. The programs themselves look good—they seem to have been well thought out and have real educational value. According to the catalog, the "Interpreting Graphs" disk is $45 with disk and backup and instructor notes (extra disk $10), and "Graphing Equations" is $55, also with backup disk and instructors notes. Reasonable! By the way, demo disks are available in English, biology, and chemistry, as well as two additional math disks—all for the Apple.

Music Programming

(Continued from page 9)

The following program plays a chromatic scale of four octaves:

```
10 MU = 768 : PI = 767 : TI =
   766 : TB = 765
20 POKE TI, 40: POKE TB, 32
30 FOR I = 1 TO 49
40 POKE PI, I
50 CALL MU
60 NEXT I : END
```



Other of the PA#1 routines can be used by applying the same idea used by the PA#1 music interface. Just keep in mind which of the variables are using reserved memory locations. Also some of the routines will not apply to Applesoft programs, such as the Renumber, Append, Tape Verify routines. The Hi-Res graphics routines are already a part of Applesoft, therefore there isn't any reason to try to use them from Applesoft. The machine language relocation and RAM test routines could easily be used, but normally you would not have to call them from your Applesoft program. These routines could be called directly while in Integer BASIC.

For those of you who don't like this method of introducing music into your programs, you could use Beagle Bros' "Beagle BASIC" with the command TONE P,L where the note's pitch P may be any value from 0 to 255, and the length L may range from 0 to 65535. These routines still play only one note at a time (which makes it difficult to play harmony), but you can always save up your pennies for a music synthesizer card.

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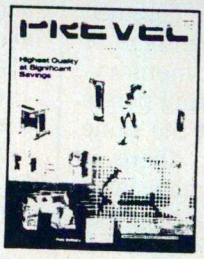

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][+ VS. *//e* MONITOR ROMS

Question

I have written an Applesoft program around a Morse code program to permit disabled persons using the Morse key to go in and out of programs on the disk. It works well on the Apple][+, but on the IIe, when it gets to the point where a selection is to be entered, the computer beeps continuously and I have to kill the program with RESET. Are the memories so different between the][+ and IIe?

Answer

The *IIe* and][+ are actually very similar. A][+ with a Language card has RAM memory configured exactly the same as a 64K *IIe*. The Applesoft interpreter program in ROM is also the same in both machines. If you boot DOS 3.3 from the same disk on both machines, then the DOS is the same. Thus it is quite surprising that a "plain vanilla" Applesoft program will not work on both machines. In your case I suspect the problem is with the machine language Morse routine. At the top of ROM memory in the Apple is a series of routines that control basic operating functions of the Apple such as reading the keyboard, printing to the screen, beeping the speaker, etc. Collectively they are called the Monitor ROM. When Apple designed the *IIe* they changed where some of these routines are in memory. Although documented starting points have generally been left at the same addresses as in the][+, there is nothing to prevent a machine language programmer from jumping into the middle of one of these routines. It seems likely that the Morse program jumps into the middle of a routine that has been moved or changed in the *IIe*. Not having a listing of the Morse routine, it is nearly impossible to tell exactly what is happening or why the speaker keeps beeping. Once things go haywire with a machine language program anything can happen.

Even though the][+ and *IIe* are very similar, there are other differences besides the obvious ones of a different keyboard and lower case on the *IIe*. See the next question.

Question

I recently wrote some BASIC programs on a][+ and put them on a disk. The HELLO program immediately prints ASCII 4 "RUN [filename]," and [filename] begins by loading "HR.PACKER" and "HR.UNPACKER," two utilities for doing compressed graphics. It then loads a compressed graphic. This all works fine on the][+, but when tried on a IIe the disk starts to load [filename], then stops. The screen fills with lo-res symbols, and the system locks.

By experimenting I found that if any BASIC program is run on the IIe which loads a hi-res screen, then the above HELLO program can be RUN and it works, i.e. [filename] runs. Based on this I put a command HGR into HELLO just before PRINT ASCII 4 "RUN [filename]," and the HELLO program then boots on the IIe and runs [filename].

The manual says the IIe and][+ have the same DOS 3.3 and Applesoft, and I am wondering why the HGR command is needed on the IIe but not the][+. Since I am doing a graphics package which needs to run on either machine, not knowing makes me nervous.

Answer

Dear Nervous: I understand your apprehension. However, there should be no problem with RUNning [filename] from your HELLO program on a *IIe*. (I just tried it to be sure and it works fine.) It's possible that something else is going on with your HELLO program before you RUN [filename]. Or, it may be that HR.PACKER and HR.UNPACKER are being loaded in okay but when HR.UNPACKER tries to load in and display the graphics picture the problem occurs.

Some of the soft-switches that control the graphics/text display operate differently in the *IIe*. This is because the *IIe* has an 80-column mode and an alternate character set built in. There are also additional switches to bank switch the extra memory on the 80-column card. In addition, provision has been made to read the status of these switches, a nice feature that is not available on the][+. I would guess that HR.UNPACKER is not setting these switches properly for the *IIe*. When Apple came out with the *IIe* they also released a new version of DOS 3.3. Unfortunately they didn't change the version number so many people aren't aware that there is a slightly different version for the *IIe*. This version takes care of a few additional initialization tasks associated with the 80-column card and the extra soft-switches. I'm pretty sure the new version will also run on a][+. Try copying your programs to a disk with the new version of DOS 3.3 and this might solve your problem.

Another alternative is to modify HR.UNPACKER to make sure all the soft-switches are set properly. Now that you've read all this garbage, probably the best thing to do is what you have already done, put an HGR at the beginning of the program.

As a corollary to this I have discovered one undocumented "feature" of the soft-switches on the *IIe*. If you are in the 80-column mode it is impossible to switch to the hi-res graphics mode. Presumably it is also

impossible to switch to lo-res graphics although I haven't tried it. This problem is fundamental in the *IIe*. With the 80-column soft-switch "ON", nothing happens if you try to change the soft-switch from text to graphics mode. The display stays in the text mode. The only way to get to graphics is to first switch back to the 40-column mode. For Applesoft programmers this means that if you have turned on the 80-column card with PR#3, the HGR command will work peculiarly. Although your graphics will be written properly in the graphics memory you will not see them, as the *IIe* is still displaying the text page. You must first turn off the 80-column card by typing [ESC] control-Q or by printing a control-U from your program (use PRINT CHR$(21) to print a control-U).

UNSCHEDULED SURGERY

Question

I did a dumb thing the other day, I pulled a card out of my Apple while it was turned on. I was trying to see the position of the little switches on the card and without thinking pulled it out. Now my Apple doesn't do anything when I turn it on. The power light comes on but it doesn't beep, won't boot a disk or anything. Is there something I can do short of taking it to a dealer?

Answer

Happens to the best of us. There are one or two things you can try. It's possible that one of your peripheral cards was damaged and this is preventing the computer from operating. First thing, then, is to "turn the Apple off" and remove all the peripheral cards. Then try running it to see what happens. If you get the Applesoft prompt (assuming you have a][+ or *IIe*) everything is probably okay with the motherboard. If you have a *IIe* you can run the internal diagnostic program by simultaneously pressing CONTROL, CLOSED-APPLE, and RESET. If the basic computer works you can isolate which peripheral card is causing the problem by putting in the peripheral cards one at a time and try running the machine each time. More than one card may be damaged, so try them all. If, on the other hand, your computer is still dead with all the cards removed I'm afraid you are in for a trip to your dealer. Be sure you take all your peripheral cards with you as there may still be a problem with one or more of them.

The power supply in the Apple is designed to turn itself off if there is a short circuit somewhere in the circuitry. If you turn the Apple on, hear a clicking sound and the power light is off or blinking, then the power supply is badly overloaded. Although leaving the computer on while this is happening won't damage the power supply, it's not a good idea to leave it on for a long time. Again, a first effort would be to remove all the peripheral cards and see if the problem disappears.

UNDERLINING IN APPLEWRITER

Question

I have an Apple][+, an Okidata 92 printer, and Applewriter II. My problem is that when I try to underline a group of words that are split between two lines, the underlining starts where it should, continues to the end of the line, and then starts at the left edge of the paper and extends to the end of the group of words. Why is it underlining where the left margin should be? Do I have to stop the underlining at the end of the line and start it again at the beginning of the next line?

Answer

The problem is that there are two different ways to underline words. What you apparently are doing is sending a character sequence TO THE PRINTER telling it to underline. This works except for the case you describe. Applewriter generates a left margin by printing spaces at the beginning of each line. If you have specified a left margin of 10 in Applewriter, then 10 spaces are printed at the beginning of each line. Your printer isn't really aware of what is happening, all it knows is that it should underline every character including spaces. The way around this is to use the Applewriter underline command, the backslash "\". Type the backslash before and after the words you want underlined and it won't underline the left margin. (Since Apple][+s don't have the backslash character, Applewriter II lets you use shift-control-P to generate it.) What Applewriter does is to print the character, "print" a backspace, and print an underline character. This works fine for most printers, but on some EPSONs the underline character is one dot shorter than it should be so the underline comes out as a series of dashes. You can use the EPSON underline command to get a solid line but you should realize that you will run into the problem described above.

There is a bug in Applewriter. When it stops printing the underline it prints an extra blank character. This is particularly annoying if the next character is punctuation and no space is desired. The way around this is to put a backspace character between the backslash (which turns the underlining off) and the next character. This can be done by typing control-V, left-arrow, control-V.

LO-RES SCREEN DUMP

Question

I have asked everyone I know if they are aware of a Lo-res screen dump program. A few have said that they seem to remember seeing something like that in one of the computer periodicals but can't exactly remember. Do you know of such a program?

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Circle 21 on Reader Service Card

Answer

I am sure that there are many such programs around. I have received a rather unique one in the mail from Douglas Seeley of High Bridge, NJ. Doug's program (listing 1) draws an outline of the Lo-res picture and as Doug says "In order to complete the pictures, you need one additional piece of hardware—a box of crayons." Although Doug doesn't say, his program is apparently written for EPSON printers (witness lines 60 and 220). However it should not be too difficult to modify it for other printers. Line 60 changes the printer to condensed printing and the line spacing to 8 lines per inch. The CHR$(14) in line 220 returns the printer to normal type size for printing the heading. Just substitute the appropriate codes for your printer. If you don't have a *IIe* you won't be able to enter the "|" character that appears in several lines. Replace the |, the spaces, and the quotes with CHR$(124)" ," CHR$(124)" ," and " CHR$(124) respectively for lines 90, 120, and 140. The underline character is printed by CHR$(95).

If you are willing to compromise on quality somewhat (or the doctors won't let you play with sharp things like crayons) it is not hard to write a program. The problem is that it is difficult to represent the 16 colors of the Lo-res screen on a single color printer. One way is to use 16 different symbols to represent the colors. Listing 2 shows how to do this. Each symbol is printed twice to maintain the aspect ratio of the screen. For even better results you should change the line spacing to 8 lines per inch. You should already have loaded the picture into the graphics screen when you run this program.

Listing 1

```
10  REM PAINT BY NUMBER
    BY DOUGLAS A. SEELEY
20  LF$ = CHR$ (10)
30  INPUT "LOAD WHAT
    PICTURE?";F$
40  GR
50  PRINT CHR$
    (4)"BLOAD"F$",A$400"
60  PRINT CHR$ (4)"PR#1":
    PRINT CHR$ (15) CHR$
    (27)"0"
70  PRINT "  ";: FOR X = 0 TO
    39: PRINT "_";: NEXT
    : PRINT LF$
80  FOR Y = 0 TO 39
90  PRINT "| ";: FOR X = 0 TO
    38:SC = SCRN( X,Y) : IF
    SC < > SCRN( X + 1,Y)
    AND SC < > SCRN( X,Y +
    1) THEN PRINT CHR$ (SC
    + 97);: GOTO 110
100 PRINT "  ";
110 IF SC = SCRN( X + 1,Y)
    THEN PRINT "  ";:
    GOTO 130
120 PRINT "| ";
130 NEXT : IF SCRN( X,Y) < >
    SCRN( X,Y + 1) THEN
    PRINT CHR$ ( SCRN( X,Y)
    + 97)"|": GOTO 150
140 PRINT " |";
150 IF Y = 39 THEN 200
160 PRINT "  ";: FOR X = 0
    TO 39: IF SCRN( X,Y) =
    SCRN( X,Y + 1) THEN
    PRINT "  ";: GOTO 180
170 PRINT "_";
180 NEXT : PRINT LF$
190 NEXT Y
200 PRINT "  ";: FOR X = 0
    TO 39: PRINT "_";:
    NEXT : PRINT LF$
210 PRINT LF$: PRINT
    "a = black b = magenta
    c = dk blue
    d = purple e = dk green
    f = gray g = blue h = lt blue
    i = brown j = orange
    k = gray
    l = pink m = grn n = yellow
    o = aqua p = white"LF$LF$
220 PRINT SPC( 66 - LEN (F$))
    CHR$ (14)F$LF$LF$
230 PRINT CHR$ (4)"PR#0"
240 END
```

Listing 2
Generic Lo-res screen dump

```
100 SY$ = "#%&?*<!:@;>.+,/
    "
110 PRINT CHR$ (4)"PR#1"
120 REM SET PRINTER TO 8
    LINES/INCH HERE
130 FOR Y = 0 TO 39
140 FOR X = 0 TO 39
150 C$ = MID$ (SY$, SCRN
    ( X,Y) + 1,1)
160 PRINT C$;C$;
170 NEXT X: PRINT
180 NEXT Y
190 PRINT CHR$ (4)"PR#0"
200 END
```


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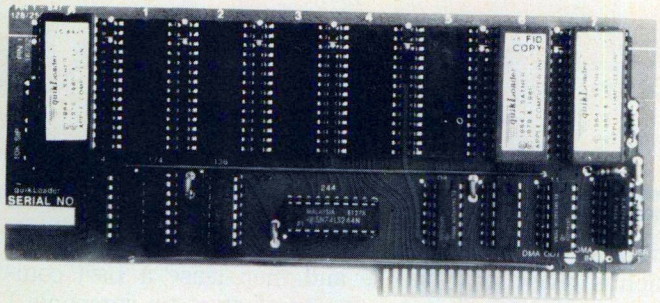

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The quikLoader is the *fastest* way to load programs. **BAR NONE!** Applesoft, Integer, or machine language programs can be loaded in fractions of a second. More importantly, DOS is instantly loaded every time the computer is turned on. Integer is even loaded in the language card. This process takes less than a second, saving valuable time.

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Putting your own programs on the quikLoader is easily done, using a separate EPROM programmer, and the instructions that we supply. For APPLESOFT, INTEGER, or single machine language files, you simply take an "image" of the program, and put it into the working array of the programmer. Add a few bytes for the overhead and catalog, and instruct the programmer to "burn" the EPROM. Plug it into the quikLoader, and your program is now **instantly** available to be cataloged, loaded, or run. No programming knowledge or experience is necessary to do this. You **will** need experience if you want to save copy-protected or complex programs. The amount of experience necessary depends on the complexity of the program.

COMMERCIAL PROGRAMS

If you have a program that is valuable, it will become **more** valuable when it is instantly available to you. SOUTHERN CALIFORNIA RESEARCH GROUP is actively seeking licenses from software publishers to allow their popular programs to be made available for the quikLoader. Independent authors are encouraged to write programs suitable for the quikLoader. If the author wishes, we will market the program (with appropiate royalties), or the author can take care of all marketing. In either case, we will make known to our customers the availability of these programs.

We start your library of programs with the most popular utilities on the card, FID and COPYA. Now, if you have to copy a disk, you don't have to search for the master disk. You can start copying within 3 seconds after turning on the computer.

We are currently licensed to sell two very popular programs on PROM. **DOUBLE—TAKE** by BEAGLE BROS., and **COPY][PLUS** by CENTRAL POINT SOFTWARE. The introductory price for DOUBLE—TAKE is $45.00. This includes the program exactly the same as you would buy it at your dealer for $34.95 (including disk and documentation), and a programmed 27128 EPROM (worth about $25.00). COPY][PLUS cost $65.00. This includes the original program (worth $39.95) and **two** programmed 27128's. More commercial programs are now in the works.

MEMORY CAPACITY

The quikLoader has eight sockets for EPROMS. These sockets can accommodate the standard 27XX series of EPROMS. Types supported are the 2716, 2732, 2764, 27128, 27256, and 27512. These types can be freely intermixed. The memory capacity of the quikLoader depends on the EPROMS used. For example, the 2716 can hold 2K of programs, and the 27512 can hold 64K. (Frankly, the current costs of the 27512 is prohibitive,but should come down drastically in the next year.) At this writing, the least cost-per-bit is provided by the 2764, which can hold an 8K program. Using these "chips", the quikLoader bcomes a 64K ROM. Using larger capcity EPROMS allows it to become a 128K, 256K, or even a 512K card. If more memory capacity is needed, the quikLoader operating system supports multiple quikLoaders.

INCREASED DISK CAPACITY

Since DOS is loaded from the quikLoader every time the computer is turned on, it is not necessary to take up valuable disk space with DOS. This will give you more than 5% additional space for programs and data on your disks.

ADDITIONAL FEATURES

The quikLoader has some other handy features. The following keys, pressed in conjuction with "RESET" will perform these actions:

Z—"Cold boot"
H—Run "HELLO" program
D—Boot disk
X—Enter Mini-assembler
B—Boot only
C—Catalog disk
Q—Display catalog of programs on quikLoader
M—Drop into monitor.

To run a program from the quikLoader, bring up the quikLoader catalog (Q-reset), and the names of the programs will be displayed, along with an index letter. Pressing the index letter will instantly load and run the program. If you wish to load the program without running it, this option is available to you.

While the quikLoader catalog is being displayed, pressing the "Z" key will toggle the parameter display, showing PROM address, RAM destination address, and length.

Up to 23 programs on the quikLoader can be displayed on the screen at one time. If you have more programs, you may scroll through the catalog (either direction) for up to 256 programs.

The quikLoader is **ideal** for applications requiring a dedicated computer. Your program can be automatically loaded and run at "power-up".

ABOUT THE DESIGNER

The quikLoader was designed by Jim Sather, author of UNDERSTANDING THE APPLE][(forward by Steve Wozniak), published by QUALITY SOFTWARE (21601 Marilla Street, Chatsworth, CA 91311 (818) 709-1721).

REQUIREMENTS

The quikLoader plugs into any slot of the APPLE][+ or //e. If used in a][+, a slightly modified 16K memory card is required in slot 0. A disk drive is required to save data.

DOS, INTEGER BASIC, FID, and COPYA are copyrighted programs of APPLE COMPUTER, INC. licensed to Southern California Research Group to distribute for use only in combination with quikLoader.

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other products

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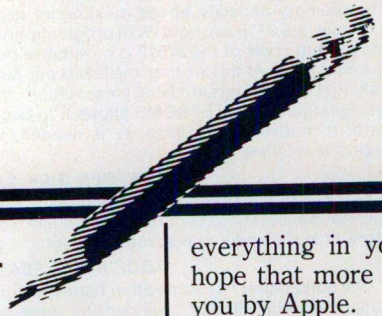

THE READERS

Apple and A.P.P.L.E.

Dear Editor:

I would like to respond to your editorial in the March issue of *Call -A.P.P.L.E.*. I would like to express some frustration with Apple and I would also like to let Apple know just how important your users' group has been to me. The frustration is simple —*Call -A.P.P.L.E.* answers the questions Apple fails to. Letters to Apple about problems or questions simply go unanswered for the most part.

I brought the first Apple II to Taiwan having purchased it in San Francisco and carried it in with my personal luggage. (Honest, it wasn't mine they copied!) I went to work putting it to use as a very important tool in the analysis of sociological data. Working up my own software programs for my work here, I fell in love with this micro long before I could buy the type of software that now goes far beyond what I can do.

A couple of years or so went by and I added a II+ and then two of the earlier *III*'s and three more II+'s. In the meantime, disk drives, a card reader, printers, etc. were added and we had a small social science research computer center established. Most of it was purchased through a dealer in San Francisco, and the frustration with Apple as well as the dealer grew. Simple questions took hours and days of searching while letters went answered. I'm waiting now and have been for months (years?) for some kind of word on how those *III*'s that were supposed to be so easy to upgrade can be upgraded.

I realize that we are not a big customer of Apple's, but there are many even smaller and they seem to get as much or more out of *Call -A.P.P.L.E.* than I do. I agree with everything in your editorial and do hope that more attention is given to you by Apple.

Thank you for the continued help *Call -A.P.P.L.E.* has been, and not least for your friendliness in giving this help.

Daniel Ross, S.J.
Chair
Department of Social Work
Fu Jen University, Taiwan

Dear Editor:

I am responding to your editorial on page 58 of the March issue of *Call -A.P.P.L.E.* Your organization has been of great benefit to me and I personally resent Apple Computer's treatment of A.P.P.L.E. in connection with the recent Macintosh announcement.

I now have a Macintosh, and I expected A.P.P.L.E. to help me understand this new machine and decide what additions to make to my system. I now find out that Apple Computer harbors some silly notions as to the role of user groups. You can understand why I am upset. I purchased over $3,000 worth of computer equipment. The computer has no application software and an extremely complex software system which no store people fully understand, and Apple Computer now treats my one reliable source of information as a poor relation. All other serious computer manufacturers have user groups and they treat them with respect! What is Apple's problem?

If the idea of tendering a much needed service is too abstract for the guys in Cupertino, perhaps they will understand this: I currently own over $6,000 of Apple computer equipment and have recommended Apple computers to others who subsequently purchased them. Also, I helped to choose and then lease a Lisa computer to a small start-up company. I guess that makes me responsible for nearly $20,000 of Apple computer equipment in the last 2 years. Part of the reason I could confidently recommend Apple equipment was because of the knowledge I gained through A.P.P.L.E. You people are responsible in dollars and cents for thousands of dollars of purchases!

Keep up the good work!

Edward C. Cheadle Jr.

To the Editor:

After reading your editorial column in the March 1984 issue, I felt that I had to write this letter in support of the A.P.P.L.E. user group. I feel that this organization has shown the highest quality of professionalism possible. The services and products offered by the A.P.P.L.E. user group are always current and trouble free. I feel that the treatment of A.P.P.L.E. by Apple Computer, Inc., has been a slap in the face. It is depressing to watch the years of staunch and loyal support casually ignored by a rapidly growing company such as Apple Computer. The management of Apple Computer should realize that without user groups such as A.P.P.L.E. and the large numbers of professional and end users who rely on such user groups, Apple Computer, Inc. would be just another mediocre firm.

Joey L. Baltrusch
3620 Spencer St. #5
Torrance, CA 90503

Directions

Dear Editor:

Here are some personal answers

to the questions you posed in your March 1984 Call -A.P.P.L.E. Editorial: Have we been following the right path? What should be our future course?

I joined A.P.P.L.E. in 1982, having learned about the organization from a friend. I was very impressed with the usefulness and technical excellence of articles in *Call -A.P.P.L.E.*. My favorite articles described "utilities." They had utilitarian value to be sure. However, I thought their greatest value was in teaching us how our machines worked, how we could take advantage of the strengths already there, and how we could even improve on things and do more than the designers envisioned. You gave us program models to follow and to improve on if we felt so challenged. In other words, for me, the highest achievement of the magazine and the organization has been educational.

I would say that a computer education has much in common with other kinds of education. It most requires imagination, discipline, proficiency with language, planning and exercise of logic. These are skills and values which can be improved by having and using a computer. It is my opinion that the power of a computer as a tool depends directly on how well its language and capabilities can be accessed by the user. A.P.P.L.E. has been foremost in showing us ways of using our machines at just the point where Apple Computer manuals leave off.

If A.P.P.L.E. and *Call -A.P.P.L.E.* keep on this track, they will continue to have my support and blessings. I don't think we should be worried about names that we may be called or that we should expect a big corporation to use exactly this standard. We Apple users and Apple Computer have different needs, but we do need each other. The club's best interests should be pursued, I think, in this light.

Best wishes,

Jim Popenoe

Dear Editor:

As a new member of your illustrious organization, I found your most recent editorial very provocative, and worthy of a serious response by a newcomer to the Apple computer.

I was horrified to learn of the apparent total disinterest of Apple Computer, Inc. as exhibited by their lack of sharing advance information on the Macintosh. My opinion would be that their marketing outfit prevailed in the higher echelons of management and warped the good judgment of people who should know of the past significant and the continuing contributions of associations like A.P.P.L.E.

Your editorial prompted me to consider what is my need versus the old time computer user. My need is for office production and I buy software that I believe will meet these objectives. I do not have the time to spend money, many hours trying to make the software produce as advertised. I'm result oriented and buy the software to do the job. I think the "hacker" enjoys the challenge of creating his own programs and/or takes whatever time is necessary to make programs work. He has extensive knowledge of programming in the various languages and knows the computer inside and out, and has many tricks up his sleeve to be able to work from within programs. I religiously read Apple dedicated magazines from cover to cover searching for quick and easy solutions, so that I can improve my small office production. Many helpful hints have been found that have solved some minor problems. In time, my computer knowledge will improve and allow me more opportunities to solve my own problems quickly and effectively.

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To summarize, I think the new computer buyer today is a different breed of cat. He has heard all about the great capabilities of the computer and seeks immediate gratification from his purchase. He is not interested nor is it necessary for him to follow in the same footsteps as his predecessor who has essentially grown up in the evolution of the personal computer. We all wish to capitalize on his extensive knowledge and ostensibly the new software programs capitalize also on his experience and knowledge. This is what we hope we buy when we purchase a proprietary software program. But the software industry is highly fragmented and interaction with various computer configurations is inadequately considered. Support by software creators and hardware makers leaves much to be desired.

Thus a newcomer turns to the various user groups as his only alternative when his computer dealer, software company, or hardware maker is unable or unwilling to take the time to solve his problems, or point him in the direction of a solution. This is the perceived need by today's novice with his Apple. I also believe there is a definite need for patch programs for these novices whereby interface problems can be solved. I, for one, thought the patch created for the full use of the ULTRATERM as being illustrated of what a newcomer needs.

Ernest T. Cragg
Major General, USAF (Ret)

Dear Editor:

First off, let's say it straight out: Your March editorial on the Macintosh situation smacked of sour grapes from start to finish. Combined with the Member Billboard article, there was a sense of self-abasement/denigration that I've never before read in *Call — A.P.P.L.E.*'s pages. Times change, amigo; there may certainly be the same number of hackers/programmers as ever, but they have become proportionately smaller as a group, which is not to say unimportant as a group.

The aggregate community of Apple product users is changing in interests and needs. With the proliferation of quality software that addresses a wide spectrum of applications, gone are the days of programming as necessity to ensure productive use of one's Apple II. Note the word "necessity": a personal computer owner can still opt to construct his/her own programs tailored to specific needs. Likewise, hardware experimenters can still tinker away until their hearts are content in the area known as Slots 0–7 (or 1–7 for *IIe*–ers). To be sure, there is still considerable interest in hacking no matter what the language. However, it is an illusion at best to attribute the Apple *IIe*'s explosive sales from January 1983 to March 1984 to the multitude of hackers that "Apple couldn't care less about." The surge of *IIe* popularity came about due to a rising level of collective intelligence among the computer-buying public. They realized the computer for what is: an expandable, excellent-value-for-the-money machine that has a stupendous ever-increasing base of software. Maybe you're conveniently neglecting the fact that the basic II design is now 7 years old. The *IIe* was the first step in extending the life of the one and only; John Sculley's recent announcements attest to the fact that Apple is deeply committed to prolonging the life of its most successful product to date. And that commitment is to the development of software (ProDOS) and peripherals (a mouse and ProFile) that keep abreast of recent strides in semiconductor technology. Any other approach would be tantamount to stagnation, if not product suicide.

Enter Macintosh.

Not a hacker's machine as defined in the sense of the II family (and even the *III* to an extent), this little wonder brings ever closer to reality the concept of computer as appliance. Dissemination, like it or not, is what it's all about. Computers are tools, not talismans accorded to those who willingly brave electronic rites of passage.

Neglect programmers and hackers? Never!!! Keep those assembler utilities, but in perspective. Let's concentrate more on applications, please.

Pre-1984, *Call -A.P.P.L.E.* suffered from a lack of cohesion. On one hand you meticulously detailed an arcane utility, on the other you offered stupefyingly useless information. The problem was a lack of unifying direction. It appears (hallelujah!) that the tide is turning. Much improved graphics, layout and use of color all contribute to a classier endeavor. The decision regarding the covers is splendid in and of itself. With more revampings, Call -A.P.P.L.E. just may equal the other Apple magazines, while retaining its particular flavor.

Francis J. Kwok

Dear Editor:

In response to your March 1984 editorial, my feeling is that without the "hackers" in the personal/home computer world, et al, the technology would not be as far as it is today. As to your question about the magazine, I think it's one of the finest I have had dealings with.

If Apple Computer, Inc. decides that we are not the market they are looking for, then they will be the loser. In the majority of the cases where I have had to call upon someone for the programming help, both in APPLESOFT as well as in Assembler, I have received that help from the A.P.P.L.E. staff and not from the local dealers. They are salesmen in the instances that I have found, and have given me some phone numbers for the manufacturers so I might pursue the question I have had, but they are not technically oriented towards solving that problem. I'm sure their intentions are good, but their time is usually limited and in most cases they are understaffed.

If Apple wishes to pursue this line then I feel they will not be the winner they are now. The "Company Policy" here where I work is to "standardize" on IBM, and it's a decision I'm not surprised about coming from a rather large firm.

In my opinion, the best thing Apple has going for them is the 750,000+ computers in the hands of the hackers which amounts to a pretty large Research and Development group. I am proud to be a "hacker" and I picked the Apple because unlike any other computer firm I am aware of, they said "here it is boys, you can get inside it and play till your hearts content. We will even give you schematics to it so see what developments you can come up with." Most of the other firms I have had experience with have held a "proprietary" seal on their innermost secrets.

As to your next to last paragraph, in my opinion, "yes" you are on the

right path. I do think you are in tune with the times, and the future course should be in furthering the very line that has made the Apple II, II+ and *IIe* the success it is now. The line is continuing what I call the R & D of the beast. Pique our interest with small tidbits such as how we may control peripherals, how we may control things around the house, how we may make it easier to keep house inventories, etc...

Keep up the good work!

Jerry D. Womble

Lisa/Mac Support

Dear Editor:

I was disappointed to read your editorial in the March 1984 issues concerning the deteriorating relationship of our user group with Apple. I thought I was the only one being displaced and shunned by Apple's marketing strategy. I have owned an Apple II plus for several years and have purchased a Lisa recently with the intention of writing scientific software. I was turned down (off) by Apple from being a "certified" developer because I do not have a product ready to market immediately. I have owned the Lisa for four months and still don't have the programming languages that I initially ordered. I can not help but feel that this is a "Catch - 22" situation! I thought the idea of being "certified" was to get extra help and information from Apple in order to develop a software product. Evidently this is not the case.

I am a professional programmer working for a research company. I have written software that would be of interest to industrial and medical organizations. I might add that I have full responsibilities for three Digital Equipment Corporation PDP 11's and partial responsibility for a VAX 750. I am currently working on real-time data acquisition and process control application. I feel that I should qualify as a "certified developer."

I would recommend to any independent programmers interested in developing software for the Lisa or the Macintosh not to buy their systems until they have a programming language in hand. I feel that Apple has been digging a hole and has buried its head like an ostrich. It is a question of how big of a hole Apple digs before IBM sets the grave marker!

Dennis Cielaszyk

[*For a further discussion of this problem, see the article by Dave Redhed titled "Save The Toolkit" elsewhere in this issue.*]

40/80 Switching on Apple *IIe*

Dear Editor:

I recently had a problem with my Apple *IIe*, switching between 80 and 40 column modes. I thought to myself ... didn't I see something in a recent issue of *Call -A.P.P.L.E.*...

My journey took me through the 80-column Text Card Manual, the Apple *IIe* Reference Manual, and to the December '83 issue of *Call -A.P.P.L.E.* My problem began when, after running a program which used the 80 column card (PR#3), I loaded and ran a program which used the 40 column display with the BASIC FLASH command. Suddenly my displays were all messed up. Funny... that program was working before. FLASH doesn't work now... After about an hour of head scratching, I discovered that the problem lay in my 80 column program, not the 40 column. This is because I unsuccessfully attempted to restore the 40 column mode at the end of my 80 column program before ENDing.

As the *Call -A.P.P.L.E.* article, "Fixes For the Apple *IIe* DOS 3.3" pointed out, you cannot get from an 80 column to a 40 column display by using PR#0 either directly or when returning from outputting to any other slot. You simply get disconnected from DOS. Apple's 80 Column Text Card Manual warns against attempting this (pages 26 and 27) then proceeds to tell you the preferred method for deactivating the 80 column card is to hit ESC-CTRL-Q. Naturally, from within an APPLESOFT program you would use PRINT CHR$(17) to accomplish it, as both the 80 Column Text Card Manual (page 45) and the *Call -A.P.P.L.E.* article indicate. This is exactly what I did from within my 80 column program, and I wrongly assumed I was in a normal 40 column mode and all was right with the world. Trouble is, outputting a CTRL-Q is not exactly the same as hitting ESC-CTRL-Q. If you have a *IIe* try the following program:

```
100 PRINT CHR$(4);"PR#3"
200 PRINT CHR$(17)
999 END
```

What you get is a solid, non-flashing cursor. You still have an active 80 column card. Notice that the + sign appears when the ESC key is hit.

If you attempt to use 40 column features such as FLASH from within a program or if you concatenate a 40 column program behind an 80 column program, watch out! How does one correctly restore the true (original) 40 column mode from within a program once the 80 column card has been activated? In the depths of the *IIe* Reference Manual (Page 46) I found the answer: CTRL-U, i.e., PRINT CHR$(21).

Now let me see... wasn't there a CTRL-U somewhere back in that 80 Column Text Card Manual? Sure enough. It is never mentioned in any of the programming examples or in the text but it can be found in the Table of Control Characters on page 46.

LETTERS POLICY

Call—A.P.P.L.E. welcomes letters from its readers on any topic relating to the magazine's content, A.P.P.L.E. services, experiences with hardware and software, current issues in computing, or programming notes. Because of space limitations not all letters can be selected for publication or printed in their entirety, but we try to present a representative sample of your views. If you would like your address published, please include it near your signature.

The *Call –A.P.P.L.E.* article says that if bit 7 of ALCHAR is set (PEEK (–16354) > 128) then the 80 column card is active. It also states that if bit 7 is off then you have a checkerboard cursor. Not so:

```
100 PRINT CHR$(4);"PR#3"
200 PRINT CHR#(17)
300 LET X = PEEK (-16354):
    REM TEXT ALTCHR
310 PRINT X
400 POKE 49166,0 : REM
    ALTERNATE CHAR SET
    OFF
500 LET X = PEEK(-16354) :
    REM TEXT ALTCHR
510 PRINT X
999 END

RUN

141
13
```

We added some lines to the first program to read the status of the soft switch (141 , bit 7 = 1), turn the switch off so that we are no longer in the Alternate Character Set, and read the status again (13, bit 7 = 0) and END. Notice that we still have our solid, non–flashing cursor – the 80 column card is active.

The author of the *Call –A.P.P.L.E.* article is mostly concerned with making PR#0 hook correctly with DOS and behave like PR#3, where my main concern is restoring true 40 columns from within a BASIC program. Instead of using CHR$(17) like the article indicated, I recommend using the CHR$(21):

```
100 PRINT CHR$(4);"PR#3"
200 PRINT CHR$(21)
999 END
```

Happy bit–whacking!

Joe Stoutenburgh

THE Spreadsheet and Smarterm II

To the Editor:

This letter will hopefully help anyone out there trying to get THE SPREADSHEET to work with the SMARTERM II 80 Column board. The problem lies in a JSR to $FC22 at location $8376 in the spreadsheet program. The routine that is being called normally calculates the next screen address from the horizontal and vertical cursor positions but it also alters the contents of the registers where the SMARTERM II expects to find the information it needs to position the cursor.

There is an easy way to correct this problem. Make a copy of the SPREADSHEET disk; then using a disk zap program read in track $09, sector $0A. The bytes in locations $76, $77 and $78 of this sector should be 20,22 and FC respectively. If you have made it this far, change each of these three bytes to an $EA which will put three NOP's in place of the subroutine call. Save these changes back to the copy disk. THE SPREADSHEET can now be configured to use the SMARTERM II in video slot 3 and no video driver is required.

Bob Callaghan
3672 Seville Lane
Saginaw, Michigan 48604

ProDOS Convert

Dear Editor:

When converting files to ProDOS, the CONVERT program kindly adds a period to multinames filenames but it doesn't scan the actual file for multinames so the user has to alter these.

If you use a Menu Program like the DISK MENU program in the Applesoft manual then the name of the program in the menu is read into TITLE$ and used directly to RUN any called program, and if the contents of TITLE$ contains spaces then it crashes to program.

To get over this we added the following lines:

```
9070 TL$ = " "
9071 FOR I = 1 TO LEN
     (TITLE$) :
     IF MID$ (TITLE$,I,1)
     = " "
     THEN TL$ = TL$ + "."
     : GOTO 9073
9072 TL$ = TL$ + MID$
     (TITLE$,I,1)
9073 NEXT I : TITLE$ = TL$
```

We hope you all find this routine useful.

Michael Trinder

ML in ProDOS

Dear Editor:

Having confronted the problem myself, I'd like to add my two bits to the discussion on stashing machine language (ML) programs in ProDOS begun by Cecil Fretwell in the April issue.

1. A call to GETBUFR ($BEF5) secures an area for ML programs that is NOT immediately above HIMEM, the favorite DOS 3.3 hiding place. The pages made available are counted down in memory, beginning with page $99. (BASIC.SYSTEM occupied $9A00 to $BDFF.) Immediately below the newly created ML turf is a ProDOS temporary buffer of 4 pages, or 1k. Therefore, ML programs which are engineered to extend to $95FF to conserve memory in DOS 3.3 would be reassembled so they reach to $99FF, before conversion to ProDOS. And by the way, when can we expect a ProDOS Big Mac?

2. Calls to GETBUFR reset HIMEM without further human intervention. For instance, a call to GETBUFR with $7 in the accumulator will mark off 7 pages of memory (from $9300 to $99FF) for ML use and also lower HIMEM from its usual $9600 to $8F00. The area from $8F00 to $92FF is the new location of the aforementioned temporary buffer.

3. The effect of GETBUFR is cumulative. Two successive calls with $7 in the accumulator will result in HIMEM lowered a total of $E (14) pages, to $8800. If a call to GETBUFR is part of your program, you should close the program with a call to FREEBUFR ($BEF8) to restore HIMEM to its usual location. Arguably, every call to GETBUFR should also be preceded by one to FREEBUFR, for the sake of safety. The following relocatable program, which I keep at $300 does this handily:

```
300: 20 F8 BE A9 07 20 F5 BE 60
```

For reasons which remain obscure to me, this fragment works only from Applesoft (CALL 768), and not from the Monitor (300G).

4. He who fails to adjust the system bit map to protect his ML program is in for a rude surprise. ProDOS plays fast and loose with buffers in memory, and may jump any claim you have not registered with the bit

map. Protection is fairly easy to do. Work downward from $BF68 (49003), whose bits 0 through 7 control the allocation of pages $9F down through $98 respectively. This location normally contains $3F (63) following a boot (i.e., bits 0 through 5 are set), indicating pages $9A through $9F are already in use (in this case, by BASIC.SYSTEM). Bits 6 and 7 can be set by poking a 255 into 49003; this tells ProDOS that pages $98 and $99 are now reserved. To carry the example further, poking a 31 into the next lower location (49002, which contains 0 after a boot) sets bits 0 through 4 of that byte, reserving the next five pages downward ($97, $96, $94, and $93 respectively). To prevent problems later, the exit of the program should clear the bits set in this manner.

5. If your ML program sets HIMEM, you must either delete the routine that does so or, from Applesoft, reset HIMEM immediately after BRUNing it, to a value appropriate for ProDOS (first byte on a page of memory). I've taken the latter lazy man's path to date with Print Using and Friends and Cornelis Bongers' Quicksort II, and have them operating together in ProDOS. They are a potent combination.

Bill Burd

Variable vs. Variable

Dear Editor:

I find myself fascinated and awed at Cornelis Bongers' article, "The Earl of Varspace," in *Call -A.P.P.L.E.*, January 1984. After three months of reading and re-reading, I am beginning to understand it and feel that with only a few more smart pills I could implement the utility. I continue to learn more about my Apple with each perusal.

However, I wonder if a less thunderous approach would satisfy my more modest needs for local variables in a subroutine library. First of all, Applesoft accepts a wide variety of variable names. There are essentially three categories: the 26 single letter names, the nearly 676 double letter names (we must remember not to use "TO," "AT," etc.), and the 260 letter-digit names.

I almost never use the 260 letter-digit variable names — they make excellent candidates for variables to be reserved for local usage. I think I will call these variables "A0 variables" from the alphabetically first member of the group. It is quite easy simply to forget to use them in my main program, especially if I feel the urge to use longer, more descriptive, names such as C. Bongers' example COUNT.

The use of A0 variables only in subroutines is an easy discipline to follow, especially for us less-than-full-time programmers. This discipline automatically solves the problem of conflict of variables between the main program and subroutines. (Since input variables acquire their values from the main program and output variables communicate their values to the main program, they would be barred from being A0 variables.)

Unfortunately, this discipline would not solve the problem of conflict of variables between one subroutine and another!

Now for the real purpose of this letter—the simplest, most straightforward, solution of this problem that I can imagine is beyond my ability to execute. I am asking for someone to provide a certain utility through the pages of *Call -A.P.P.L.E.*

What I envision is an "& CLEAR" m/l utility. The & CLEAR command would be given just before the RETURN command in each subroutine that uses A0 variables. (Alternatively, we could have an "& RETURN" command which executed first the & CLEAR and then a normal RETURN.)

In execution, & CLEAR would simply search the variable tables (both simple and array) and, if it found a variable with a digit for the second character of its name, remove it from the table so that it no longer existed.

The next subroutine to use the same A0 variable would recreate it and then, when no longer needed, destroy it with an & CLEAR.

For most of us with more modest subroutine libraries than the professionals, this would give an adequate amount of local variables without the memory headaches of creating new stacks, variable tables, etc.

I hope that someone will recognize the value of this utility and accept the challenge of programming it.

Ellis R. McDaniels
199 Columbia Drive
Williamsville, NY 14221

Keyboard Compatibility

Dear Editor:

Since I use both Apple II (all flavors) and Macintosh, there is a certain frustration over minor differences in the keyboards. I long ago managed to train my fingers to accept either the II/II+ or the *IIe* layout, with only a few errant backslashes or episodes of holding down a key waiting for it to auto repeat when it never did. But with the Mac, which we are now using for all our writing, and even for editing things which are subsequently shipped to the II, I quickly became accustomed to the backspace key in the upper right corner of the keyboard. Unfortunately, on the *IIe* this is the Delete key, which generates a different ASCII code ($FF) that is not welcomed by most Apple II programs (and certainly not by the monitor, by Big Mac, or by Applesoft). Little rows of boxes appear on the screen, and nothing (good) happens.

A simple solution presented itself: change the character input routine to trap the delete code and replace it with a backspace. This can be easily implemented using the input hook, but we did it instead right in the monitor (which is already in RAM as we load it into the Accelerator card). It turns out that there is just enough space for the alternate routine, which is shown below, to replace the original. We give up the incrementing of the so-called random number counter (which we don't use anyway, since for floating point numbers we use the method published in *Call -A.P.P.L.E.* in Jan. '83).

```
KEYIN   FD1B 2C 00 C0  BIT KBD          Test for key-
                                        press
        FD1E 10 FB     BPL KEYIN        Nope
        FD20 91 28     STA (BASL),Y     Replace flash-
                                        ing cursor
        FD22 AD 00 C0  LDA KBD          Get character
        FD25 2C 10 C0  BIT KBDSTRB      Clear keyboard
                                        strobe
        FD28 C9 FF     CMP #$FF         Is it a delete?
        FD2A D0 02     BNE NOTDEL       Nope
        FD2C A9 88     LDA #$88         Make it a back-
                                        space
NOTDEL  FD2E 60        RTS              Normal return
```

I hope that this approach, or another variant of it, will assist other people using both machines and wanting to make the keyboards more nearly identical, or anyone who finds the present delete key less than useful

John Russ

JUNE 1984

MEMBER BILLBOARD

Service to New Members

WE'D LIKE TO extend a warm welcome to the many, many new members who have joined our growing ranks in recent months. As more people throughout the country and the world become aware of the enormous benefits of A.P.P.L.E. membership, our staff has been hard-pressed, but generally successful, in keeping up with the large number of inquiries and applications.

In most cases, a new member can expect to receive a membership card—with an official member number—within two weeks of applying. It is necessary, of course, to have a valid membership number when ordering catalog products either by mail, phone, or in person. If you would like to place orders before your card arrives in the mail, here is what to do: (1) identify yourself to the order taker as a new member; (2) give your name, address, and the date you applied for membership; (3) then place your order. That's all there is to it.

Combination Package Policy

As a special service, A.P.P.L.E. frequently offers a combined package of two or more products at a price that is significantly discounted from the total cost of the individual items. The great popularity of these packages has encouraged us to continue and expand them. In order to avoid any confusion, we would like you to be aware of our policy regarding refunds if any single item in a package is returned to us.

Should you find it necessary to return some, but not all, items in a combination package for refund, your bill will be adjusted as follows. The cost of the item(s) that you keep will be refigured based on the individual, regular price. Then the difference between that cost and the special package price will be credited or refunded.

Winners

We would like to congratulate the following members who, by sending in their *Call -A.P.P.L.E.* Reader's Choice cards, were selected to receive $100 worth of A.P.P.L.E. products. Ralph L. Thompson of New York, NY was drawn from the box at our April meeting, and David J. Fritzsche of Reno NV was our May winner. Keep those cards and letters coming in, folks.

Next we present a Member Billboard special that should be of interest to both old and new members.

ODE TO VAL'S BASEMENT

by Dave Lingwood

Big things start in unlikely places. The Apple I was designed in a bedroom. "Started in the garage" has become a cliche.

And then there was Val Golding's basement. THE Basement.

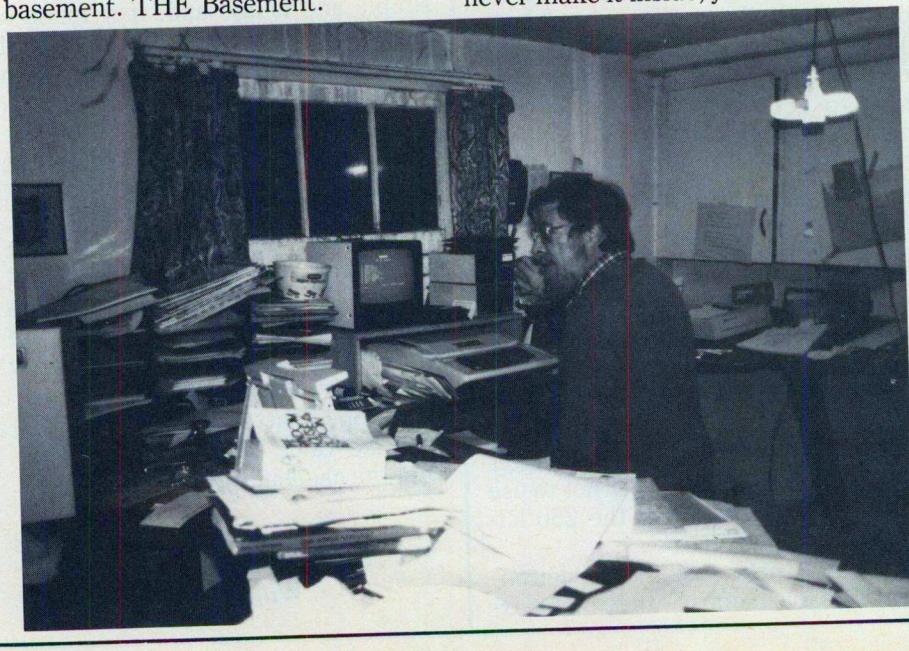
Now, you have to understand, Val comes from a long line of intellectual pack rats. Not only has he been interested in a stupifying array of stuff over the years, but he's congenitally incapable of ever throwing anything away.

When these two characteristics are applied to physical space, the result is a melange of today's interests propped, literally, on the passions of yesterday. You can't really tell if the mixture is the result of a busy lifestyle, or the kind of cognitive complexity which organizes things in the mind, not on the shelf.

A trip through The Basement is, like descending the Grand Canyon, a travel through time. The top-most layer of sediment records well the recent history of Apple microcomputing in general and A.P.P.L.E. in particular.

A Guided Tour

The thirties-ish brick home perches on the Puget Sound view side of the West Seattle hill. If you arrive during a Summer sunset you might never make it inside, just from the ef-



fects of the scene. Many of us Seattle folk live this way, though, and we even adjust to the view after awhile.

The living room doesn't concentrate out at the view, though. It focuses in, on the jazz collection, the trumpet from his band days, the video equipment, and the coffee table strewn with *Call -A.P.P.L.E.* article drafts and blue lines.

Call -A.P.P.L.E. was produced here for the first year or so. The ancient IBM Executive typewriter in the dining room banged out the first issues. You think back to that very first issue, Volume 1, #1 (*February, 1978*), in which Val said, "Unfortunately, I do not have the time available to continue this project [A.P.P.L.E.] beyond the formative stage; therefore the first order of business will be (hopefully) to find someone that can." Lucky for us that person was never found; Val became both President and Editor.

Past this, through the kitchen, and down the narrow stairs (made narrower through their double duty as a filing system), and you come to The Basement. The space is divided in two sections. The first half hasn't been too badly impacted by the computer sediment layer. It is vintage stuff. The motorcycle (circa the thirties), the trolley signs and memorabilia, the stacks of 78 records, dominate here.

Trolleys? Yes, Val's a trolley nut, and even a published author in the field. Destination signs from long-forgotten routes line the walls. If you wait long enough, the trolley might just stop here again, for a journey back in time.

Once upon a time, model trains were a rage here. Half of the space is ringed by a U-shaped counter top, which (being particle board) has developed over the years a case of severe undulations between the supports. Like a journey through Iowa, the tracks navigate up and down gentle hills.

Computer sediment buries the tracks in most places, however.

The Apple][perches at the narrow bottom of the U, against the cement basement wall. It's pure vintage][, serial number 759, purchased in December, 1977. It took a long time to get him to put an autostart ROM in the thing. Val was the last user in the known world to work through a game port printer driver; but that went away, greatly lamented, a couple of years ago. There's now a serial card in one, modem in two, Integer card (what else?) in 4, clock in 5 (a bow to ProDOS), and the controller in 6.

He hasn't turned it off in years. Maybe Val can't reach the switch. Or then again, perhaps he's just cautious: once he did switch off to change a card, and his supply died.

Val works standing up much of the time. Chairs take up room.

The modem plugs into one of the phone lines. Disks full of articles and documentation have been drafted and edited here, screeched onto paper on the old IDS printer, then pumped over the phone line to the typesetter.

The Basement also serves as a destructive testing center for diskettes. Whenever a new disk comes in, the jacket is removed and magically evaporates. Bare disks coexist in mounded piles with printout, manuals and unidentifiables — often with the ashtray on top. Few of these disks ever seem to crash. Amazing technology, that.

Back issues of magazines perch in stacks, mingled with the trolley parts. Pigeon hole racks contain bits and pieces of old and new Call -A.P.P.L.E.s. There's a well-creased Apple Red Book. Apple Orchard volume 1 is here (Val edited it, too, early on). Here are cassettes, DOS 3.1, 3.2, 3.3, ProDOS — history on the march. Program listings are almost equally divided between Applesoft and Assembler, though there is some Integer BASIC still (and forever). Program content runs to utilities, rather than applications.

On the other side of the U is the phone answering machine ("Hel-oo, this is Val Golding. . . "). Most of the time the lost and the helpless get right through, however. Val was the only voice of the hotline for years, and in recent times the night and weekend voice. Most of the calls get answered from memory. Other times Val will dive into one of the stacks of papers, magazines and notes, usually surfacing with the answer.

Packing

One of these days, The Basement will get weeded, cleaned and packed for Val's move back to California. It would be simpler just to jack up and move the house.

What will go and what not? The answer would tell a lot about the man. My guess is that the best of all the years' layers will get packed. Certainly the music and the trolley things will. Val's much-coveted Apple I and the Apple][will go. There will also be boxes upon boxes of other Apple stuff.

Moving must always be painful for eclectic, renaissance men. But I think it's harder on those left behind. I wonder what it would cost to have a whole basement bronzed?

THE MARKETPLACE

The following items are selected by our editorial staff from the large number of product announcements and news releases sent to us daily. They are presented solely to keep you informed about the current market for Apple related hardware and software. As we have not tested many of these products, appearance here does not necessarily represent endorsement or recommendation by A.P.P.L.E. Watch for evaluative reviews in future issues of *Call — A.P.P.L.E.*.

COORDINATED ACCESSORIES DESIGNED FOR APPLE'S NEW *IIc*

San Francisco, CA — Apple Computer introduced today a series of accessory products for use with the new transportable Apple *IIc*. The optional add-ons, all styled with the same look, enhance the *IIc*'s capabilities.

A multi-color high-quality printer based on new thermal-transfer technology, a high-resolution monochrome monitor and stand, a "mouse" pointing device, an external disk drive, an external power pack and a carrying case have all been specially designed for the *IIc*.

In addition, the existing Apple modems, joystick, hand controllers, Imagewriter printers and color plotter work with the *IIc*.

The accessories plug into icon-labeled sockets in the back of the *IIc*, thus eliminating the need for add-on cards. Each of the products extends the *IIc*'s functions. For example, the new Scribe thermal-transfer printer lets users print letters, manuscripts, mailing lists, spreadsheets, graphics and more, in either six colors or in black. The modem, available in either 300-baud or 1,200-baud models, connects computers in distant locations through the telephone lines.

Price and Availability:

All accessories are available from Apple now and have suggested retail prices as follows:

Scribe printer	$299.00
Monitor *IIc*	$199.00
Monitor Stand	$39.99
AppleMouse *IIc*	$99.00
Disk *IIc*	$329.00
Imagewriter printer	$595.00
300-baud modem	$225.00
1,200-baud modem	$495.00
Joystick	$59.95
Hand controllers	$34.95
Extra power pack	$39.00
Color plotter	$779.00
Carrying case	$39.00

LINE OF ENHANCED SOFTWARE PRODUCTS FEATURED FOR APPLE *IIc*

San Francisco, CA — Apple Computer, Inc. today announced that it will feature 21 newly developed or enhanced software packages for the Apple *IIc*. Apple selected these 21 software packages to offer the *IIc* user a variety of serious application programs that are useful in the home and that take advantage of the *IIc*'s special design features.

For example, since the *IIc* comes with 128 kilobytes of random-access memory (RAM), programs written for it can be more complex, easier to learn and can store more information than previous versions. With this amount of memory, the *IIc* can support the most powerful of the Apple *IIe*'s applications.

Another *IIc* feature that software developers have taken advantage of is the "mouse" pointing device, the same as that used with the Apple 32 SuperMicro line of personal computers. Some of the enhanced programs incorporate this cursor-control tool.

Still other programs use the *IIc*'s ultrahigh-resolution-graphics mode (560 by 192 pixels) to produce high-quality graphics.

Developers have agreed to restrict these enhancements to Apple versions of the software products for six months.

Below is a list of the 21 featured packages for the *IIc*:

Productivity

1. Apple Access II—from Apple Computer, Inc.
2. AppleWorks—from Apple Computer, Inc.
3. Bank Street Writer—from Broderbund Inc.
4. CompuServe Consumer Information Service—from CompuServe Corp.
5. Dollars and Sense—from Monogram/Tronix Publishing Inc.
6. Dow Jones Investor's Workshop—from Dow Jones & Co. Inc.
7. Financial Cookbook—from Electronic Arts
8. Multiplan—from Microsoft Corp.
9. Personal Tax Planner—from Aardvark/McGraw-Hill
10. PFS:File and PFS:Report—from Software Publishing Corp.

Home Education

11. Apple Logo II-from Apple Computer, Inc.
12. Crypto Cube—from DesignWare Inc.
13. Fact and Fiction Toolkit—from Scholastic Wizware
14. Grandma's House-from Spinnaker Software
15. Mastering the SAT—from CBS Software Inc.
16. MasterType—from Scarborough Systems
17. Rocky's Boots—from The Learning Company
18. Stickybear Shapes—from Xerox Education Publications
19. The Apple Education Classics—from Apple Computer, Inc.

Entertainment

20. How About a Nice Game of Chess -from Odesta Corp.
21. Zaxxon-from Datasoft Inc.

FACT OR FICTION: *IIc* SOFTWARE FOR KIDS

New York, NY — Scholastic Inc. has introduced Fact And Fiction Tool Kit, to coincide with Apple's unveiling of its new *IIc* computer. Fact And Fiction Tool Kit turns the computer into an open-ended tool which challenges kids as they create information banks and write and illustrate their own stories. It is the first original children's computer program, published by a company other than Apple, that has been designed specifically for the *IIc*, and takes full advantage of the new machine's capabilities.

Fact And Fiction Tool Kit, for children ages 8 and up, contains two programs. "Story Maker" takes advantage of the *IIc*'s double hi-res graphics, and enables children to write, illustrate and print their own stories. Using a mouse or joystick, children can draw in 16 different colors. They can also illustrate their stories by selecting from a colorful gallery of over 60 pictures, featuring animals, vehicles, plants, shapes, and fantasy creatures. "Story Maker" allows children to use eight different type faces, and to combine graphics and text on the same page.

"Secret Filer" is an easy-to-use electronic filing system which lets children collect all sorts of information and then helps them sort, save and edit their own files. Children will gain practice in organizing information, and in learning how to use a database.

Fact And Fiction Tool Kit, is priced at $39.95. Use of the program requires an Apple *IIc* or *IIe* with 128k and 80 column card, and AppleMouse or joystick, and an Apple Imagewriter printer (optional).

"MASTERTYPE" TO TEACH DVORAK KEYBOARD ON APPLE *IIc*

San Francisco, CA — An enhanced version of "MasterType" has been introduced by Scarborough Systems. The new "MasterType" is designed to teach Dvorak keyboard skills on the Apple *IIc*.

The Dvorak system, designed and patented in 1936 as a means to dramatically increase typing speeds and efficiency, is gaining wide acceptance today in business and government. A typist using MasterType to master the Dvorak keyboard can achieve increased speed and comfort and a reduced error rate because the most frequently used keys are placed on the "home row" beneath the user's strongest fingers.

Scarborough Systems, Inc. is at *25 North Broadway, Tarrytown, NY 10591; 914-332-4545*

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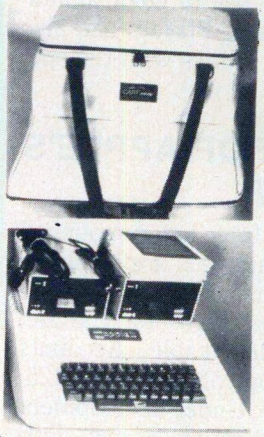
(Franklin Available July '84)



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DVORAK KEYBOARD FEATURED IN NEW WORD PROCESSOR & TYPING TUTOR

Santee, CA — Roger Wagner Publishing announced that the typing tutor that accompanies their word processing software, The Write Choice, features a full set of lessons for the Dvorak keyboard on the new Apple *IIc*. It is one of the first typing programs that support the Dvorak keyboard on the Apple *IIc*, as well as being the first typing tutor that comes with a word processor.

"Tut's Typer," which is an integral part of "The Write Choice," has an ancient Egyptian theme to the Hi-Res graphics game portion, but also features a full keyboard illustration screen with an interactive keyboard drill in which the computer shows the proper finger placement for each key to be typed.

"Tut's Typer" also supports the standard Apple *IIe*, along with the Apple II/II+ computers. There are 24 lessons each for both the standard QWERTY and the Dvorak keyboards. The software can keep track of up to 25 individual users, and retains last lesson, average words per minute, and fast- and slow-key information for each user.

It is available as a combination offer in "The Write Choice," a word processing package from Roger Wagner Publishing, at a total package price of $44.95 and is distributed through computer stores nationwide. "Tut's Typer" is available separately at $19.95.

ROCKY'S BOOTS FOR THE APPLE *IIc*

Menlo Park, CA — The Learning Company has enhanced Rocky's Boots to take advantage of the special features of the Apple *IIc*. With the enhanced version players can now save games in progress to disk for future use. It is also one of the few products that provides the option of using the AppleMouse *IIc* in addition to the keyboard or joystick.

Including 40 different logic games, Rocky's Boots is an electronic erector set that teaches the basics of building computers in a playful interactive environment. It enables players, from nine year olds to adults, to design logic machines through the use of color animation and simulated computer circuits. Players can also create any number of personalized games with the special graphics editor.

SERIOUS SOFTWARE FOR APPLE'S PORTABLE COMPUTER

Austin, TX — BPI Systems, Inc., has announced that six of its business software packages are available now for the Apple *IIc* portable computer.

BPI will offer the following packages for the *IIc*: General Accounting, Accounts Receivable, Accounts Payable, Payroll and Inventory Control, each for $425; and Budget and Analysis, for $195. Under development for summer availability is BPI's Personal Series—Personal Investing, Personal Accounting and Speed Reading. Apple will distribute the software.

To help end users and retail store staffs learn about BPI's software, the company is developing self-training aids for four of the *IIc* products: General Accounting, Accounts Payable, Accounts Receivable and Payroll. Available later this year, each aid is a computer-assisted learning program which provides individualized self-instruction.

Further information is available from *BPI Systems, 3423 Guadalupe, Austin, Texas 78705, (512) 454-2801.*

EDUCATIONAL CONDUIT

CONDUIT, the educational software publisher at the University of Iowa, has new educational software packages for the Apple II family.

Family Identification assists students in learning about 74 major flowering plant families in North America. $50.00.

Acid-Base Titrations includes eight programs: four brief introductions and four programs that construct titration curves under various conditions. $75.00.

Chemical Principles for the Introductory Laboratory illustrates the principles and methods involved in five main areas normally covered in general chemistry. $75.00.

Phonics: Decoding for Teachers includes eight programs that will help preservice and inservice teachers master the decoding concept of phonics and structural analysis. $75.00.

School Transactions features four simulations that introduce preservice and inservice teachers to the realities of human transactions in schools and to specific communications models. $75.00.

Lecciones de Espanol has seven tutorial lessons that allow students to practice applying some of the most troublesome points of Spanish grammar: para vs. por; ser vs. estar; preterite vs. imperfect; and the subjunctive (including four lessons on the uses of the present subjunctive in noun clauses). $110.00.

Topics in Research Methods: Main Effects and Interactions helps students discern whether independent variables in an experiment are exerting main and/or interactive effects on the dependent variable. $50.00.

Topics in Research Methods: Power uses simulated experiments to acquaint students with the concept of power. By comparing experiments with a number of different factors that minimize error variance, students learn how they can increase power. $50.00.

Topics in Research Methods: Survey Sampling is a simulation that introduces students to surveys and sampling procedures. $50.00.

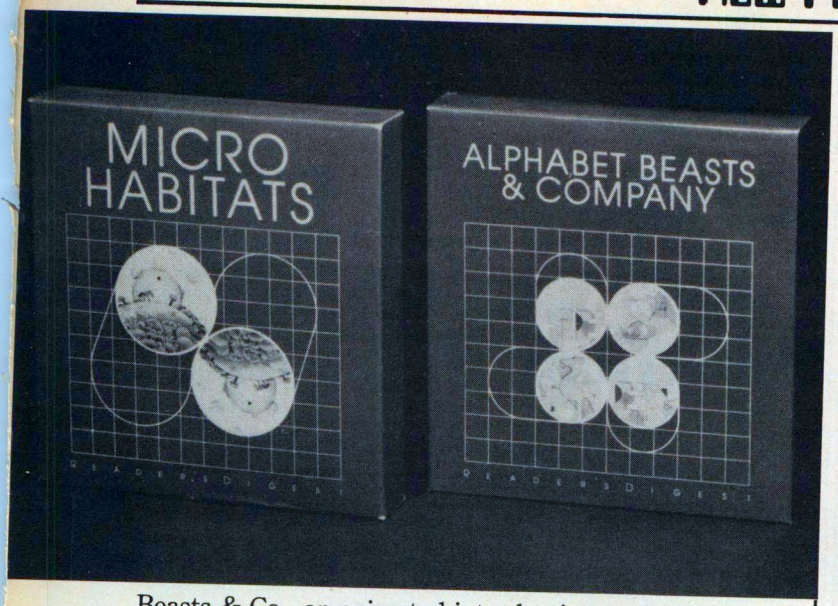
For more information contact *Jim Leaven* at *(319) 353-5789.*

LEARNING GAMES FOR THE HOME

Reader's Digest Software has introduced a line of "learning games for the home" — software packages ranging from puzzle games to word games to games of strategy and skill.

Reader's Digest's software line is segmented to serve three age groups: Early Childhood — ages 3-6; Middle Range — ages 7-17; and Adults.

Programs for early childhood users are: Alphabet



Beasts & Co., an animated introduction to the letters of the alphabet and numbers; Little People's Puzzles — Things That Go and Nursery Rhymes, puzzle programs that feature pictures of cars, rockets and other "things that go," and favorite nursery rhymes, ranging from Peter Piper to London Bridge; and Micro Habitats, a program which enables users to "construct" underwater, jungle and space environments.

For the 7–17 age set, Reader's Digest has three word games that use graphics and animation to teach spelling, reading and vocabulary skills: Trickster Coyote, Chambers of Vocab, and Key Lingo. Also there is Speedy Spides, a game that provides practice in learning facts and figures, and Puzzle Mania, computerized jigsaw puzzles.

The category for adults features Cogito, a strategy game in which players try to accumulate the most amount of money, while ever on-guard against danger and disaster.

The games, which run on various systems, including the Apple II, II+, and *IIe*, range in price from $35 to $40.

For more information, call toll free: *(800) 431-8800*. In New York, Alaska and Hawaii, call *(914) 241-5727*, or write: *Reader's Digest Software, Reader's Digest Services, Pleasantville, NY 10570*.

APPLE COMPUTER CALLS MACINTOSH A SUCCESS

Cupertino, CA — May 7, 1984 — Apple Computer announced it has shipped more than 70,000 Macintosh™ computers since the product was introduced January 24. The company originally projected it would ship 50,000 units within the first 100 days, which ended May 3, and reached that quantity in just 74 days. Apple expects to sell 250,000 Macintosh computers by September 28, the end of its 1984 fiscal year.

"Apple set very aggressive goals and we believe that we have exceeded those goals. Based on the response we've had so far, we feel that the Macintosh is on its way towards becoming the third industry standard product in the personal computer business," said Steven P. Jobs, chairman of the board of Apple. "We reached our 50,000 unit sales goal in just 74 days. By comparison, it took two and a half years to sell 50,000 Apple IIs, and seven months to sell the same number of IBM PCs. Consumer demand for Macintosh during the first 100 days was at least double the 70,000 units that we could produce."

Response from independent developers and authorized Apple dealers has been equally positive. Since the introduction of the Macintosh, Apple has received over 5,000 inquiries from independent developers. More than 1,000 computers have been sold to these firms. Of the 150 software packages anticipated by the end of the year, 50 are expected to be available this summer.

During Macintosh's first 100 days, agreements were reached with three of the nation's largest business-oriented retail chains to sell the computer, indicating significant acceptance of Macintosh in the business market. Sears Business Systems Centers, Businessland Inc. and The Genra Group—who serve the office, professional and business markets—all announced plans to carry Macintosh and Lisa.

More than 4,500 dealer salespeople have signed up for "Own-a-Mac," an Apple program that enables qualified salespeople to purchase a Macintosh at a discount after completing a sales training session. And dealers continue to report strong consumer demand for the Macintosh.

NEW SOFTWARE PUBLISHING EFFORT FOR MACINTOSH DEVELOPERS

Mountain View, CA — Forethought, Inc., a Mountain View software developer, has announced the creation of a new software publishing division targeted exclusively at the acquisition and marketing of software for the Apple Macintosh. The division will focus on software for the business market.

Forethought is in the process of selecting products now and plans to be on the market in the fourth quarter.

Developers are invited to contact *Andy Shaw* at *(415) 961-4720* to learn more about Forethought's innovative developer program.

COMPUTER-BASED MULTI-IMAGE SLIDE SHOWS

Photographers can now use their Apple computer to prepare interesting and exciting slide shows. Pacific Micro Systems, Inc. has introduced the Apple/Gemini multi-image programming system which consists of 3 basic components:

1. A peripheral card for the Apple II or *IIe*.
2. Slide show editing software on floppy disk.
3. The Gemini 2002 controller for 2 slide projectors.

The Apple/Gemini system creates shows for two to six Kodak 35 mm projectors, using professional fade in/fade out dissolve techniques. The dark interval between slides is eliminated as images blend into each other. All slide show commands can be recorded on one channel of a stereo tape recorder, leaving the other channel for nar-

ration and music. Slide/tape synchronization is assured by digital codes recorded on tape.

Special effects include superimpose, slide random access, animate, flash, fade to black, and home to first slide. Thirty two fade times are available.

The software includes commands to create, edit and simulate a show. Help pages and a tutorial on the disk make for easy learning and use.

Hardware and software:	$349.00
Gemini 2002:	$479.00

Available from stock. Contact: *William Wood, Director of Sales, Pacific Micro Systems, Inc., (415) 331–2525*

APPLE *III* ON THE AIR

Sunspot, Albuquerque, NM, has a new product for the broadcast industry, the "Sunspot Broadcast System." This computer software package is a comprehensive system for radio stations, providing automation for order management, traffic scheduling and logging, client billing, Accounts Receivable and General Ledger control, as well as extensive management information reporting.

The Sunspot Broadcast System is designed exclusively for the Apple *III* computer utilizing hard disk memory storage, and is available for single and dual radio station, with single or multi–terminal capabilities. It is designed for ease of use, installs itself automatically in about 32 minutes requiring no technical computer knowledge, and is ready for normal daily use in 3 days or less.

With over 50 programs that are integrated and menu driven, a station's operator can quickly jump from one operation to another with only a few key strokes.

Each department represents a step in the normal work flow of the business: Sales Orders are managed by the Order Department. Entered only once, all the information is available for the life of the order. The Traffic Department schedules the required advertising, produces daily logs, and controls inventory. The Billing Department creates Invoices and Affidavits of Performance for each client. Accounts Receivable tracks all billings and collections, and the General Ledger Department manages the money and the books. Management and Station Information Handles much of the information involved during this process.

More information about the Sunspot Broadcast system is available by contacting a local Apple computer store, or Sunspot in Albuquerque, (505) 255–6500.

LASER PRINTER CONTROLLER

San Diego, CA — A low cost, high performance Laser Printer Controller is available from Personal Computer Products, Inc. (PCPI). The controller provides the intelligent link between any host microcomputer and the new, low–cost compact laser printer engines, and provides the user with three distinct operating modes.

Laser Printer Portrait Mode provides full laser printer capability and supports multiple character fonts and user generated forms. Up to 16 separate character fonts are supported. Forms and text are printed concurrently in one pass. Multiple fonts in various sizes may be used on one page and even on a single line, making a very flexible, user definable document possible. Fonts can be stored either in 16K ROM cartridges or downloaded from the host microcomputer. One Font is resident on the Controller and up to 20,000 characters per page are possible.

Daisywheel Emulation Mode provides complete daisywheel printer emulation including backspacing, overstrikes, and print justification to variable margins. This allows popular software packages such as WordStar to be used without modification. Full Font and Form Generation are possible as well.

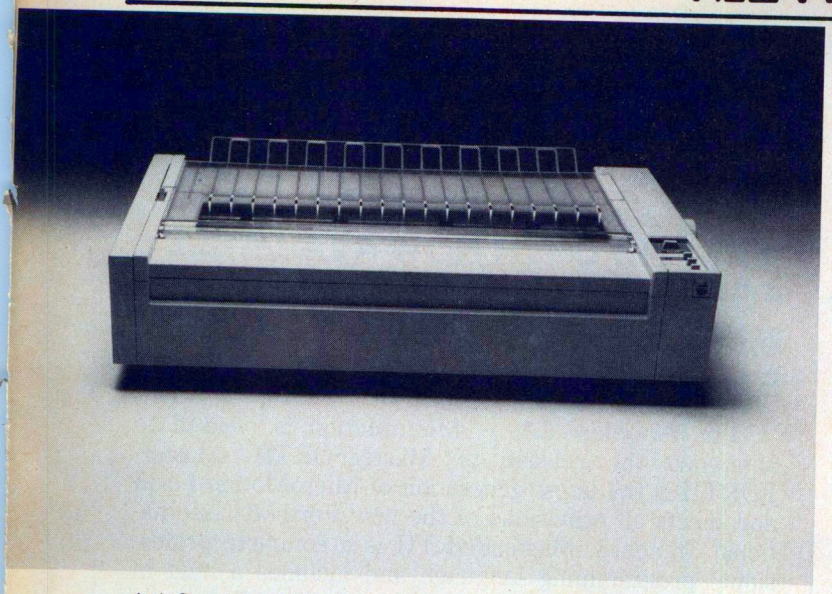
Finally, 90–degree Page Rotation Landscape Mode allows printing in a horizontal mode for reports of extra wide format. This allows printing of a 132–column and 66 lines report on a standard 8½ x 11 sheet of paper with the appropriate sized Font.

The built–in form generator allows forms to be created by a non–technical user with any standard word processing software. Forms of medium complexity can be constructed using horizontal and vertical lines, shadings, alphanumerics, and boxes. Forms are either stored in ROM cartridges or downloaded from the host microcomputer. Multiple forms may be dynamically selected between pages, under program control or manually, without stopping the printing procedure.

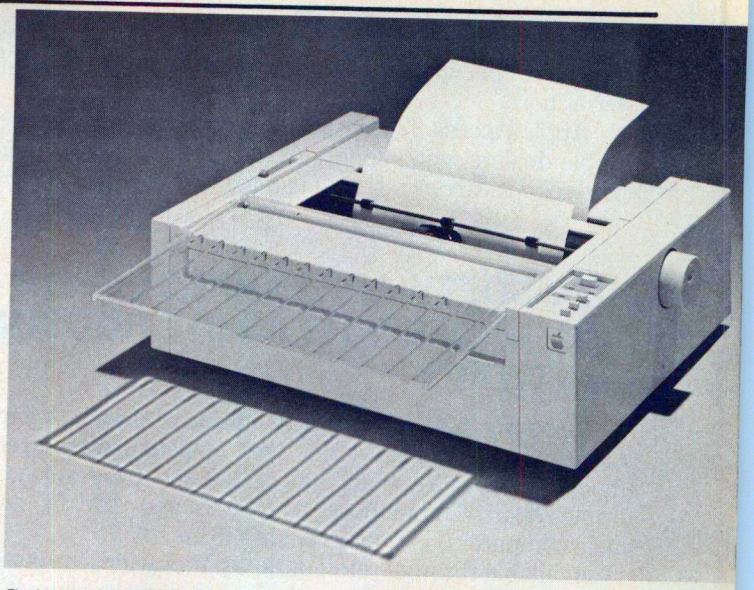
APPLE COMPUTER INTRODUCES A WIDE CARRIAGE DOT MATRIX PRINTER

Cupertino, CA — A wide carriage model of its popular Imagewriter dot matrix printer is now available from Apple Computer. The new printer is suited for producing documents that require wide paper such as spreadsheets, forecasting models, budgets and data processing reports.

The Wide Carriage Imagewriter accommodates a



Apple Computer's new Wide Carriage Imagewriter printer can be used with paper up to 15" wide.



The Apple **Imagewriter** is a low cost, serial dot matrix printer that provides high speed printing up to 180 characters per second.

range of paper sizes from 3 to 15 inches wide and is fully compatible with Apple II and Apple *III* personal computers.

Both the standard size and wide carriage models print in a 7 x 9 dot matrix at a rate of up to 120 characters per second. They also feature eight character fonts and provide variable resolution, pitch and line spacing. Various fonts, underscoring, and sub- and superscripts can be mixed in the same printed line. Both printers use either friction-feed or adjustable-width pin-feed tractors.

Each printer comes with an accessory kit that contains the appropriate connector cables, a user's guide, an applications manual and software for printing high resolution graphics.

Price and Availability:

The standard Imagewriter carries a U.S. suggested retail price of $595, and the Wide Carriage Imagewriter sells in the U.S. for $749.

3270 DATA COMMUNICATIONS SOFTWARE NOW AVAILABLE FOR APPLE *III* COMPUTERS

Cupertino, CA — A new data communications software package is now available from Apple Computer that allows Apple *III* personal computers to communicate with all mainframe, mini and personal computers that support IBM 3270 communications. Called Apple Access 3270, the program works with an Apple Cluster Controller or an AppleLine coaxial attachment unit to emulate an IBM 3278 Model 2 terminal.

Data communications is becoming an increasingly needed function for personal computer users in medium-and large-size businesses. When equipped with appropriate data communications software, the personal computer eliminates the need for a separate terminal that is designed only to connect to larger computers. In addition, the user can manipulate the retrieved data with personal computer software programs such as financial modeling and chart-making packages without consuming costly connect-time to a large computer.

Access 3270 provides Apple *III* users with a wide variety of data communication capabilities: text file transfer, on-line data entry, inquiry and response, electronic mail and remote database access. Program features include:

- support of data transmission rates from 110 to 9600 baud.
- customized help screens, enabling the user to quickly become proficient with the program.
- a comprehensive command file that provides auto-dial, auto-log-on and unattended operation capabilities.
- 3278 keyboard emulation and communications option and,
- the ability to filter control characters to or from the host computer.

The Apple Cluster Controller is a protocol converter that, when used with Apple Access 3270, emulates an IBM 3276-type cluster controller. It converts System Network Architecture/Synchronous Data Link Control (SNA/SDLC) or Binary Synchronous Communication (BSC) protocols to asynchronous protocols. Available in either SNA/SDLC or BSC versions, the Cluster Controller monitors the flow of information from each of its ports in both directions, ensuring accurate transmissions.

AppleLine provides an economical way to connect Apple personal computers to IBM or IBM-compatible networks by using existing coaxial cable installations and 3270 cluster controllers. Each AppleLine unit supports one Apple computer and can be used to access information stored within the IBM network from local and remote locations.

Apple Access 3270 requires an Apple *III* or *III* Plus computer system with at least 128 kilobytes of internal memory, an Apple Cluster Controller or AppleLine, and either a standard telephone and modem for remote access or a direct cable connection to the Cluster Con-

troller. An Apple *III* communicates with the Cluster Controller or AppleLine through its built-in RS-232C serial port.

Apple Access 3270 is available now from authorized Apple dealers who support Apple data communications products. It carries a U.S. suggested retail price of $150.

NEW SOFTWARE EXPRESS FROM SKU GUIDES BUYERS IN CHOOSING SOFTWARE

Berkeley, CA — The fourth edition of the "Software Express," a 320-page guide that helps software users choose from more than 800 of the top programs for Apple, Atari, Commodore, 64, Vic 20 and IBM PC and PCjr computers, is now available from SKU.

Available through retail outlets nationwide, the latest edition of the quarterly guide includes more than 800 listings and descriptions of the best-selling and highest-rated software on the market.

These include more than 250 new titles based on SKU's survey of national sales figures and its own determinations of the leading software programs. As in previous editions of the Software Express, outdated and slow-selling titles are deleted while newer, more popular products are added.

The new edition also includes an enlarged section on computer peripherals and accessories, an expanded glossary of 100 computer and data processing terms, manufacturer coupons worth $100 in discounts and six new tutorial articles of advice on what to look for when buying software.

"Software buyers are no longer limited to making selections from the stock on dealer's shelves," said Bob Brownell, president of SKU. "The Software Express turns any retail store into a warehouse without walls and lets the buyer choose from the most comprehensive and up-to-date listings of programs available. It lists more titles than any one store could hope to carry in stock and lets buyers custom-order on the spot."

The guide is divided into separate sections for each brand of computer. Each of these sections is further divided into separate categories for entertainment, education, business/home finance & record-keeping and utility/systems software.

Each program description lists the computer model on which the program will run, the amount of memory required, any necessary accessories and other basic information. This is followed by a narrative of the program's important features, allowing the consumer to "comparison shop" for the most appropriate product.

The guide's six new tutorial articles offer advice on what to look for when buying software. These include two articles on entertainment software and one each on word processing, data base management, personal productivity and accounting software. Written by leading software manufacturers, the articles are aimed at the first-time software buyer but also include up-to-date information of value to the computer hobbyist.

Available for the first time on a subscription basis, the Software Express is priced at $9.95 per copy of $18.95 per one-year subscription.

SKU is a distributor of software and computer accessories to mass merchandisers, computer specialty stores, comsumer electronics outlets, drug chains and department stores. The company was recently acquired by McKesson Corp. and Action Industries, Inc.

MASTERFORTH NOW AVAILABLE FOR APPLE *II / II+ IIe* USERS MEETS PROVISIONS OF THE NEW STANDARD

Los Angeles, CA — MicroMotion is pleased to announce the release of MasterFORTH. MasterFORTH is the latest generation of MicroMotion Forth and meets all provisions of the new Forth-83 International Standard. MasterFORTH is a complete professional programming language and includes a built in macro-assembler with local labels, a screen editor and a string handling package. The input and output streams are fully redirectable and make full use of the APPLE DOS 3.3 file system. Floating Point and HIRES options are also available.

The package includes FORTH TOOLS, a 200 page textbook by Anderson & Tracy, a technical reference manual, and a complete listing of the MasterFORTH nucleus. FORTH TOOLS gives the user an in depth view of input and output from reading the input stream to writing a mailing list program. Numerous examples are provided. FORTH TOOLS is the required reading for the UCLA and UC Berkeley extension courses on Forth.

SAMS PUBLISHES COMPLETE STORY ON APPLE'S MACINTOSH™

Indianapolis, IN — Howard W. Sams & Co., Inc., a subsidiary of ITT Corporation, has released one of the industry's first books which thoroughly describes Apple Computer, Inc.'s new Macintosh microcomputer for both new users and prospective buyers.

Introducing the Apple® Macintosh™ (ISBN 0-672-22361-9) is a comprehensive look at this revolutionary machine. The 189-page, illustrated volume will be available in bookstores throughout the country by the end of February.

Written by Edward S. Connolly and Philip Lieberman, experts in the fields of system integration, operation and microcomputer design, **Introducing the Apple Macintosh** explains all there is to know about the Macintosh. Both Connolly and Lieberman worked closely with Apple in their research for the book, enabling them to include accurate information on all the hardware and software elements of the Macintosh.

For example, description is provided of the user interface and screen conventions used by Apple to insure that third-party software presents a uniform method of interaction with users. Other chapters cover all peripherals and how they operate, and the keyboard and mouse (pointing device) and how they work together.

NIBBLE EXPRESS III
YOUR APPLE* WILL LOVE IT!

TABLE OF CONTENTS

Turtle Graphics 8
Applesoft Line Cruncher 14
TRAC Income System 19
MAMA 25
Amper Free Space Catalog 26
Machine Language Editor 27
Apple CALENDAR 36
Peaceful Coexistence 43
Apple Slugger 43
Reverse Key 45
Amper Find 45
Bond Manager 47
DOS 3 + 2 53
Amper Speed 57
Apple Darts 61
MicroCalc 63
Variable Cruncher 72
Life 77
Apple Flash 80
Checker 81
GO- Greeting Program 83
Quick Sort 86
Applesoft Line Editor 90
Othello 96
SPRINT 99
Disk Dump 102
Hi-Res Colors 103
Apple Record Command System 104
Apple Art Gallery 114
Game I/O Expmt 119
Super Keypad 123
Disk Commander 125
Compare Applesoft 132
Amp-L-Soft 136
Electronic Message Center 152
The Shape 155
Disk Map 159
Apple Bowl Football 161
Apple Scroller 167
Lower Case Letters 168
Recipe Box 170
Disk Doctor 178
Quasar II 182
DOS Command Entry 189
MLE Driver 189

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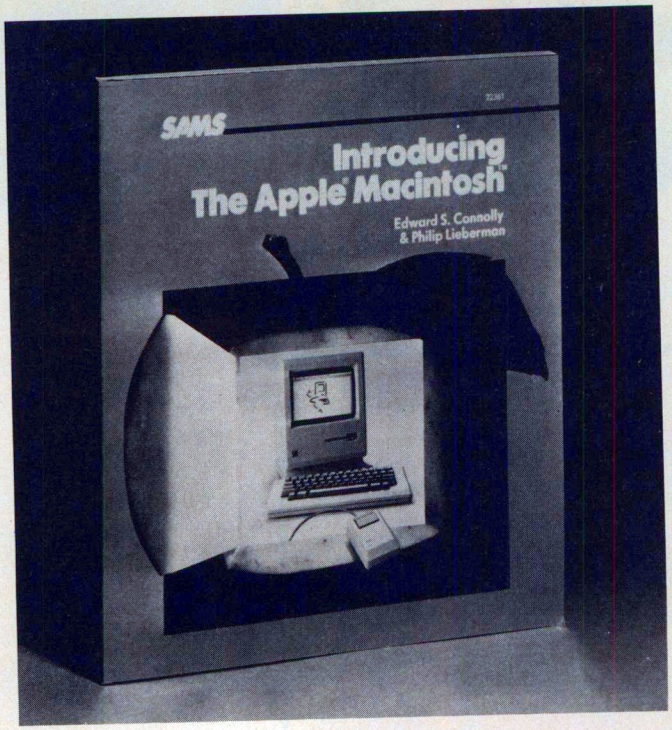


A complete discussion of the Macintosh's unique use of windows — the portion of the screen through which the user sees or views information — is also included, along with chapters devoted to the Macintosh's graphics program, MacPaint(TM), and word processing program, MacWrite(TM).

The book also gives the reader a preview of Apple programs scheduled for release this spring, including MacTerminal(TM) which, when used with a MacModem(TM), allows the user to obtain the latest stock market quotations, stay on top of international political developments and track one's horoscope. Upcoming Macintosh Pascal and LOGO programs are also briefly discussed.

Complete introductions to Microsoft's BASIC and Multiplan(TM) for the Macintosh are provided, along with four appendices on Motorola's 68000® microprocessor, the mouse, the disk drive and how to care for the Macintosh. The glossary takes the reader through a final educational tour of terminology and concepts found throughout the text.

NEW INTERFACE CARD ALLOWS APPLE *II* COMPUTER TO COMMUNICATE WITH IBM MAINFRAMES

Cupertino, CA — Apple Computer has announced a new interface card that transforms Apple® *II* personal computers into multi-function desktop computers by providing a wide range of mainframe communications capabilities. Apple *II* computers equipped with the Apple Communications Protocol Card can act as remote terminals or workstations in IBM networks, and can communicate with many mainframes, including IBM 360, 370, 4300 and 303X computers.

Tasks that now are possible with an Apple *II* include on-line data entry, inquiry and response, electronic mail and remote database access, as well as work processing, database management, financial modeling and business graphics.

Since it is programmable, the Apple Communications Protocol Card can emulate a variety of protocols, and can be reconfigured with the appropriate software. The protocol standards that presently have software support available are the IBM 2780/3780 remote job entry (RJE) station and the IBM 3270 interactive display system. Both functions utilize IBM standard bisynchronous transmission protocols. An Apple *II* equipped with the card can communicate via local or remote telephone lines at speeds up to 9600 baud (approximately 1000 characters per second).

When using the card under the IBM 2780/3780 batch protocol, any Apple *II* file or program can be transferred to any mainframe that supports the IBM 2780 or 3780 file transfer system. The card recognizes many different file types, including ASC*II*, text, binary and Applesoft. Data can be sent or received in any sequence, and up to nine files can be included in one transmission. In addition, similarly-configured Apple *II* computers, each equipped with one of the cards, can communicate directly with each other using standard telephone lines and modems.

When the system is configured to use the IBM 3270 interactive display system protocol, the Apple *II* can connect to any IBM mainframe in the System/370 series, and act as an interactive display terminal. In this mode, the Apple *II* system becomes functionally equivalent to an IBM 3271 or 3274 controller with a single attached 3278 video display unit. Since the card provides 3274 controller functions, an Apple *II* can connect directly to a mainframe via a modem without using any additional hardware.

To use the Apple Communications Protocol Card, at least one of two new Apple software packages is required. The 2780/3780 Emulator program controls the card when an Apple *II* is used for RJE applications. The 3270 Emulator is the control software that is needed to use an Apple *II* an an interactive terminal.

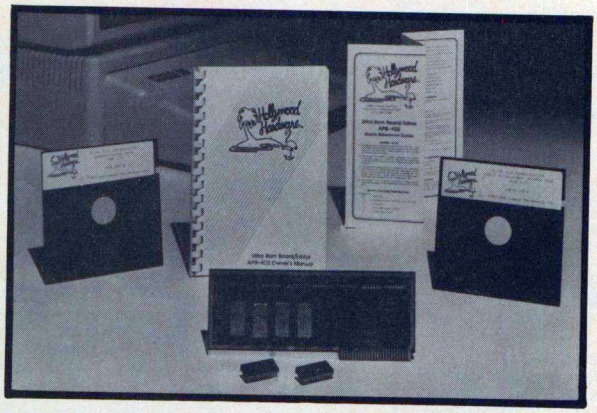
The Apple Communications Protocol Card connects to one of the built-in expansion slots of any Apple *II*, Apple *II* Plus or Apple *II*e computer.

The card, the 2780/3780 Emulator and the 3270 Emulator are available now in the U.S. and Canada through Apple's national account executives and selected authorized Apple dealers.

The card carries a U.S. suggested retail price of $700. The two emulator softare packages each sell for $300 in the U.S. The card comes with Apple's standard 90-day warranty.

A product similar to the Apple Communications Protocol Card also is available now for Apple *III* and Apple *III* Plus computers from Elcom Systems Peripherals (ESP) of Corona, Calif. ESP's Communications Protocol Card for the Apple *III* is functionally identical to and fully compatible with the Apple Communications Protocol Card.

Would You Like to Make Programming Just Plain **Easier?** Easier to Learn— Easier To Do— and 3 Times **Faster?!**



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We take all the enhancements that transform the Apple from a novelty to a powerful instrument, and hook them into the operating system, installed on their own FIRMWARE card. NO disk loading, NO loss of available memory space, NO interface with other programs. The system never need be removed - it is unhooked with two keystrokes, rehooked with four. ALWAYS IN THE MACHINE, NEVER IN THE WAY.

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a) **The ULTRA-ROM BOARD (APB102A)** Installs 32K of firmware space in any slot of your II, II+, //e. Requires no program memory.
"Nice looking, high quality hardware."... Robert Zedelis

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"The most powerful program tool I have..." Robert Wilson
"If you program, and haven't used a line editor, get one right away..." Micro Magazine review

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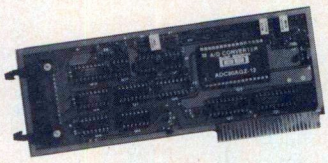

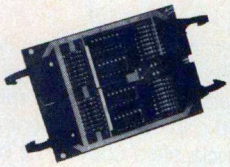

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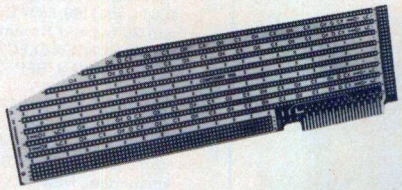

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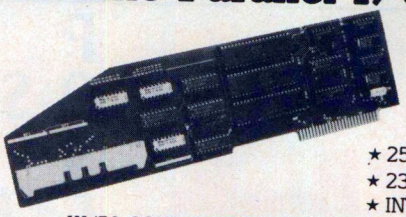

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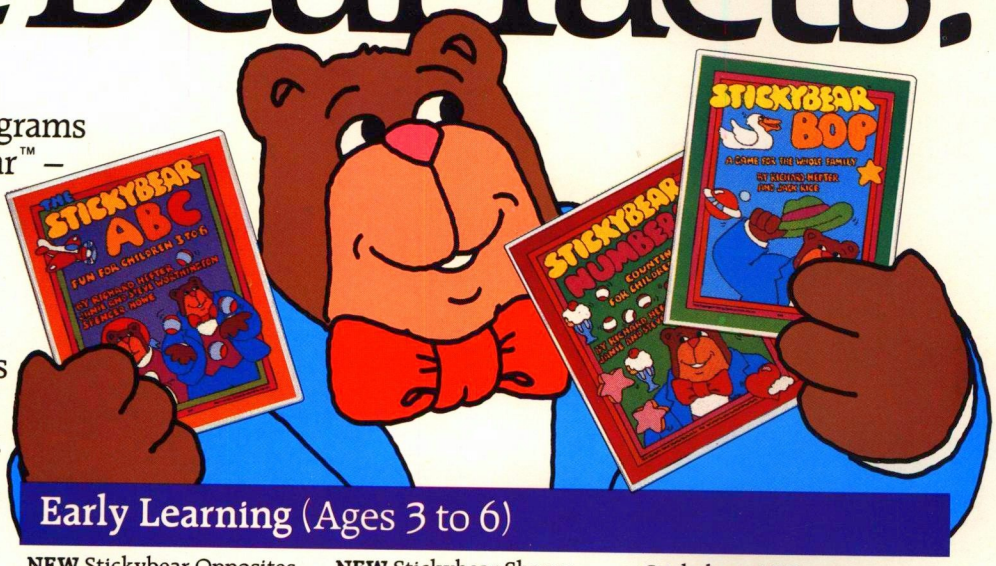

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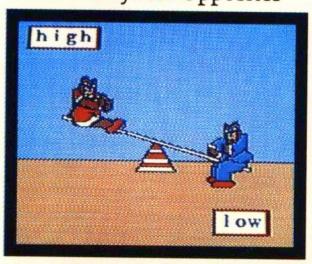

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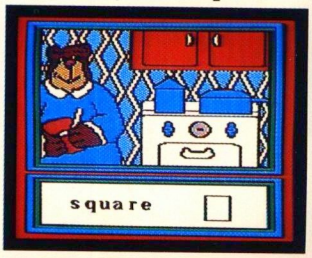

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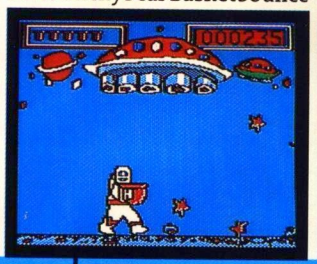

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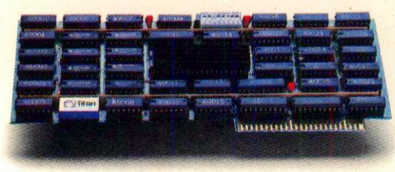

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